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Spot and Alternative Marketing Arrangements in the Livestock and Meat Industries

Interim Report

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Abstract

Over time, the variety, complexity, and use of alternative marketing arrangements have increased in the livestock and meat industries. Marketing arrangements refer to the methods by which livestock and meat are transferred through successive stages of production and marketing. Increased use of alternative marketing arrangements raises a number of questions about their effects on economic efficiency and on the distribution of the benefits and costs of livestock and meat production and consumption between producers and consumers. This report focuses on alternative marketing arrangements used in the beef, pork, and lamb industries from the sale of live animals to final sales to consumers and addresses the following parts of the GIPSA Livestock and Meat Marketing Study:

- Part A. Identify and Classify Spot and Alternative Marketing Arrangements
- Part B. Describe Terms, Availability, and Reasons for Use of Spot and Alternative Marketing Arrangements

This portion of the study included development of an industry background and assessment, review of relevant published literature, discussions with industry, and a review of available contracts.

This report describes marketing arrangements used in the livestock and meat industries and provides definitions of key marketing-arrangement terminology. The information in this report will be further refined and developed when the quantitative data from industry surveys, transactions data, and profit-and-loss statements are collected and analyzed.

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Executive Summary

Over time, the variety, complexity, and use of alternative marketing arrangements have increased in the livestock and meat industries. Marketing arrangements refer to the methods by which livestock and meat are transferred through successive stages of production and marketing. A marketing arrangement also designates a method by which prices are determined for each individual transaction. The increased use of alternative marketing arrangements raises a number of questions about their effects on economic efficiency and on the distribution of the benefits and costs of livestock and meat production and consumption between producers and consumers.

In 2003, Congress allocated funds to the U.S. Department of Agriculture's (USDA) Grain Inspection, Packers and Stockyards Administration (GIPSA) to conduct a broad study of the effects of alternative marketing arrangements in the livestock and meat industries. GIPSA developed the specific scope and objectives of the study, and RTI International (RTI) was awarded a contract to conduct the Livestock and Meat Marketing Study following a competitive bidding process.

The study examines the following species and meat types: fed cattle and beef, hogs and pork, and lambs and lamb meat. This report is preliminary and focuses on describing the methods used to transfer livestock and meat between stages of production and marketing, the terms of alternative marketing arrangements, and the reasons for using the cash or spot market or alternative marketing arrangements.¹

Cattle, hogs, and lambs are usually produced on separate types of farms at various locations across multiple operations (e.g., breeder operations, feeder operations, and finishing operations). Livestock ready for marketing are slaughtered at

¹The interim results presented in this report will be further refined, developed, and expanded after industry surveys are fielded and transactions and profit and loss data are collected and analyzed.

establishments that usually are large and specialize in one livestock species; establishments that slaughter multiple species are typically smaller operations. Carcasses and cuts from animals slaughtered may be shipped to processing establishments for making meat products that may involve combining meat from different species. Most slaughter facilities are combined with fabrication facilities that process carcasses into boxed meat products that are vacuum sealed in plastic and packaged in boxes for sale to retail establishments. After processing, meat products are distributed through wholesalers or directly to retailers, food service establishments, and exporters. Vertical integration and marketing arrangements often combine multiple stages of production of meat products. The structure of production and processing, final demand for meat products, structure of input and output markets, and types of marketing arrangements used differ substantially across livestock species and meat types.

Primary conclusions for this interim report are as follows:

- **The livestock industry from farm to retailers is complex and generally involves using a portfolio of marketing arrangements: cash (spot) markets, marketing contracts, production contracts, and vertical integration.** Supply chain management, risk management, market access, and reduced transactions costs are key factors in choosing alternative marketing arrangements.
- **Overall, there is congruence between economic theory, past empirical work, and discussions with industry participants on the reasons for selecting marketing arrangements.** Empirical research and industry discussions enable identification of the key marketing arrangements and provide insight into the factors influencing choices by participants. Choice of marketing arrangement is driven in large part by changing consumer demand for meat products.
- **Industry structure and trends have strongly influenced the portfolio of marketing arrangements in the cattle and beef industries.** Because of land requirements for cow-calf operations and genetic diversity, cash (spot) market and marketing contracts are the primary types of marketing arrangements at the producer and feeder levels. Increased concentration and consolidation in both feeding and beef packing have led to more forward contracting to improve supply chain management. At the same time, an increase in the proportion of control of

marketing prior to sale and slaughter has resulted in thinner cash markets and concern about market power of feeders and packers. Increased demand by consumers for higher and consistent quality of beef is the driving force toward use of alternative marketing arrangements.

- **A general trend is movement away from cash and spot markets toward alternative marketing arrangements in the hog and pork industries with unclear effects on producers, packers, and consumers.** Quantity and quality assurances, risk management, and market flexibility are the reasons for using a portfolio of arrangements, including spot markets, production contracts, marketing contracts, and livestock production on company-owned farms. The thinness of spot market transactions is a major concern in the pork industry, although the predominant use of spot markets in marketing and production contracts suggests spot markets are very important for price discovery. Present trends in the industry toward marketing contract design and more uniform production practices mean that carcass merit pricing is becoming somewhat less important for hog pricing.
- **The lamb industry continues to use primarily cash or spot markets with little use of alternative marketing arrangements, except for producer-owned cooperatives.** The wide dispersion of production with many specialty markets for lamb continues to characterize this industry.
- **Increased concentration and increased coordination with meat packers characterize the downstream meat industries.** Consumer demand trends toward convenience, one-time shopping, and health are the driving forces behind continued changes for retailers, food service operators, and exporters. Increased use of alternative marketing arrangements occurs because of the desire to provide a steady supply of consistent quality meat products.
- **Use of alternative marketing arrangements provides clear benefits to producers, packers, processors, and consumers that need to be weighed against the possible disadvantages.** In particular, the advantages of alternative marketing arrangements need to be weighed against creation of thin spot markets and increased market power. The magnitude and distribution of net benefits of alternative marketing arrangements across producers, packers, processors, and consumers need to be quantified.

1

Introduction

Alternative marketing arrangements include all possible alternatives to use of cash or spot markets for conducting transactions.

Over time, the variety, complexity, and use of alternative marketing arrangements have increased in the livestock and meat industries. Marketing arrangements refer to the methods by which livestock and meat are transferred through successive stages of production and marketing. A marketing arrangement also designates a method by which prices are determined for each individual transaction. The increased use of alternative marketing arrangements raises a number of questions about their effects on economic efficiency and on the distribution of the benefits and costs of livestock and meat production and consumption between producers and consumers.

The U.S. Department of Agriculture's (USDA) Grain Inspection, Packers and Stockyards Administration (GIPSA) is charged with facilitating the marketing of livestock, meat, and other agricultural products. This agency also promotes fair and competitive trading practices for the overall benefit of consumers and American agriculture. In fulfilling its mission, GIPSA evaluates, among other things, the implications of the evolving landscape of alternative marketing arrangements and pricing methods.

In 2003, Congress allocated funds to GIPSA to conduct a broad study of the effects of alternative marketing arrangements in the livestock and meat industries.

In 2003, Congress allocated funds to GIPSA to conduct a broad study of the effects of alternative marketing arrangements in the livestock and meat industries. GIPSA developed the specific scope and objectives of the study, and RTI International (RTI) was awarded a contract to conduct the Livestock and Meat Marketing Study following a competitive bidding process.

The types of questions posed by the Livestock and Meat Marketing Study include the following: What types of marketing

arrangements are used? What is the extent of their use? Why do firms enter into the various arrangements? What are the terms and characteristics of these arrangements? What are the effects and implications of the arrangements on participants and on the livestock and meat marketing system?

The study examines the following species and meat types:

- fed cattle and beef,
- hogs and pork, and
- lambs and lamb meat

and comprises five main parts:

- Part A. Identify and classify types of spot and alternative marketing arrangements.
- Part B. Describe terms, availability, and reasons for use of spot and alternative marketing arrangements.
- Part C. Determine extent of use, analyze price differences, and analyze short-run market price effects of alternative marketing arrangements.
- Part D. Measure and compare costs and benefits associated with spot and alternative marketing arrangements.
- Part E. Analyze the implications of alternative marketing arrangements for the livestock and meat marketing system.

The primary focus of this report is on addressing Parts A and B of the study, but information addressing later parts of the study is also included if available from the sources of information used for Parts A and B.

The primary focus of this interim report is on addressing Parts A and B of the study, but information addressing later parts of the study is also included if available from the sources of information used for Parts A and B. The purpose of this report is to describe marketing arrangements used in the livestock and meat industries and to define key terminology.¹ Results presented in this report are preliminary because they are based on assessments of the livestock and meat industries using published data, review of the relevant literature, and industry interviews. Responses to the industry surveys and transactions data collection that are being conducted for the study are not yet available. When the quantitative analyses are conducted for later parts of the study using the industry survey and transactions data, the information in this report will be further refined and developed.

¹A glossary of terms used throughout the report is included in Appendix A.

Parts C, D, and E of the study will be based on quantitative analyses of survey data at multiple levels of production and marketing in the fed cattle, hog, lamb, and meat industries, as well as transactions data from the largest packers and processors and downstream market participants. The reports for Parts C, D, and E will be completed in late 2006.

According to the Performance Work Statement (PWS) in the contract with GIPSA, the analyses of alternative marketing arrangements in this study will provide information to

- livestock producers to help them make more informed production and marketing decisions;
- the general public to help them understand the roles and reasons for using these arrangements;
- GIPSA for its role in enforcing the Packers and Stockyards Act (P&S); and
- USDA and Congress to help them determine whether policy changes originally considered during the development of the 2002 Farm Bill—such as restrictions on captive supplies—are warranted.

The Livestock and Meat Marketing Study is limited to economic factors associated with spot and alternative marketing arrangements and does not analyze policy options or make policy recommendations.

The study is national in scope, but it will consider regional differences among marketing arrangements, if applicable, and international dimensions related to marketing arrangements, if significant. All stages of production and marketing will be addressed, including farm level, slaughtering, processing, wholesaling and distribution, retailing, food service, and export. The Livestock and Meat Marketing Study is limited to economic factors associated with spot and alternative marketing arrangements and does not analyze policy options or make policy recommendations.

1.1 OVERVIEW OF PARTS A AND B OF THE STUDY

The aims of Part A of the study are to identify and classify spot and alternative marketing arrangements into appropriate categories for examining alternative types of vertical coordination and pricing as follows:

- Determine the methods used to transfer livestock and meat between stages of production and marketing.
- Identify the classification categories for alternative marketing methods and pricing methods.

Throughout the report, industry participants are grouped into the following categories:

- livestock producers and feeders
- meat packers and processors (or breakers)
- downstream suppliers
 - wholesalers and distributors
 - exporters
 - food service or restaurant establishments
 - retail establishments

- Develop an approach and the criteria to identify and classify types of marketing arrangements.
- Explain why and how the proposed classification categories and approach are the most appropriate for describing and analyzing alternative marketing arrangements (citing relevant theory and prior research findings).
- Implement a specific approach for collecting data to identify types of spot and alternative arrangements and associated pricing methods.

The aims of Part B are to describe the terms and availability of various types of spot and alternative marketing arrangements and associated pricing methods at all stages of production and marketing and to examine why firms use alternative marketing arrangements as follows:

- Determine—by type, size, and location of market participant—the incidence and frequency with which the various terms are used in each of the types of marketing arrangements identified in Part A.
- Describe whether and how terms vary over time (e.g., during different market conditions).
- Determine the availability of alternative marketing arrangements to market participants, by type, size, and location of market participant.
- Determine the reasons why market participants—by type, size, and location—enter into various types of spot and alternative marketing arrangements.
- Propose the following categories for the analyses in later parts of the study: types of market participants, size or groupings, and geographic regions.

As noted above, this report provides descriptive information about marketing arrangements used in the livestock and meat industries. It provides background information that will help inform later parts of the study. Concurrent with conducting the discussions with industry and reviewing the literature on use of alternative marketing arrangements for this part of the study, the study team developed and pretested information collection plans for obtaining transactions data and profit-and-loss statements from packers, processors, and downstream market participants. In addition, the study team developed and pretested a set of 10 industry survey questionnaires to obtain additional information beyond what could be obtained in

transactions data and profit-and-loss statements. Both information collection requests are currently being reviewed by the Office of Management and Budget (OMB). The results of analyses of these additional data will be provided in the reports for Parts C, D, and E of the study in 2006.

1.2 INFORMATION SOURCES USED FOR PARTS A AND B OF THE STUDY

The information sources used for Parts A and B of the study included the following:

- empirical agricultural economics and management literature,
- information from the development and pretesting of the data collection instruments for the transactions data collection and the industry surveys,
- available contract forms for beef cattle and hogs,
- discussions with trade associations, and
- discussions with industry participants.

The study team began the literature search by first identifying relevant articles written by its members. We also conducted searches using databases such as the American Economic Association's EconLit (<http://www.econlit.org/>), a database of published economics literature that includes several agricultural economics journals, and the University of Minnesota's AgEcon Search (<http://agecon.lib.umn.edu/>), an online database of agricultural economics working papers and papers presented at conferences. We also downloaded relevant reports from the GIPSA Web site and from USDA's Economic Research Service (ERS) Web site. We conducted general Internet searches using Google and other search engines to identify extension publications and trade publications with information targeted to industry participants.

Once we obtained these publications, we then identified which publications addressed issues relevant for Parts A and B of the study. In particular, we identified which publications provided descriptions of the distribution channels for livestock and meat, described marketing arrangements used in the livestock and meat industries, provided data on use of marketing arrangements, and discussed terms or reasons for use of marketing arrangements. We used information from these

The study team developed and pretested data collection instruments for the transactions data collection and industry surveys concurrently with conducting activities for collecting information and preparing the report for Parts A and B.

publications to prepare the literature review discussed in Section 2 and as context for the results presented in Section 4. Information from these publications also provided us with background information needed to prepare the data collection instruments for later parts of the study.

As mentioned above, we developed and pretested two sets of data collection instruments for later parts of the study. One set of data collection instruments will be used to obtain transactions data from packers, processors, and downstream market participants. Separate data collection instruments were developed by species at the packer level. During the pretesting process in October and November 2004, we conducted teleconferences with or obtained written comments from 24 market participants to obtain feedback on the data fields included in the request. Thus, as a result of these interactions, we obtained preliminary information on the characteristics of the products traded in the livestock and meat industries and, to a limited extent, the process of buying and selling livestock and meat.

The other set of data collection instruments will be used to obtain survey questionnaire responses from all industry segments from producers to downstream market participants. Separate surveys were developed by species at the producer level and at the packer level. During the pretesting process in January and February 2005, 31 market participants reviewed the questionnaires and provided feedback on the wording and format of the questionnaires. Thus, as a result of these interactions, we obtained additional preliminary information on what types of marketing arrangements are used, the terms of the arrangements, the reasons for using particular types of arrangements, and the characteristics of the respondents.

We obtained contract forms for the cattle and hog industries from the following sites:

- Iowa Attorney General's contracts Web site (http://www.state.ia.us/government/ag/ag_contracts/)
- University of Missouri's Contracting and Organizations Research Institute (CORI) (http://cori.missouri.edu/cgi-bin/CORI_Login.exe)
- GIPSA's Swine Contract Library (<http://scl.gipsa.usda.gov/content.aspx?page=227§ion=10>)

The Iowa Attorney General's Web site offered the most comprehensive set of contract forms. The majority of these contract forms are for contracts between livestock producers and packers. The University of Missouri's CORI Web site includes a subset of the same contract forms available on the Iowa Attorney General's Web site. GIPSA's Swine Contract Library does not contain complete contract forms but instead lists the terms from various contract forms. We reviewed the contract forms both to develop terms to be included as response items on the industry survey questionnaires and to summarize the terms for use in this report.

Prior to contacting industry participants to discuss the use of marketing arrangements, we contacted several trade associations to obtain suggestions on available information sources and learn about their characterization of the use of alternative marketing arrangements by their members. The materials we used for contacting trade associations—a project description and lists of discussion topics—are included in Appendix B. We conducted teleconferences or in-person meetings with the following trade associations:

- American Association of Meat Processors
- American Farm Bureau
- U.S. Meat Export Federation
- National Cattlemen's Beef Association
- National Pork Producers Council
- National Sheep Industry Improvement Center
- Texas Cattle Feeders Association

In addition, the National Meat Association and the American Meat Institute assisted us with gathering information on the transactions data collection process.

Several trade associations, primarily representing the downstream market participants, declined to participate in a discussion with members of the team. In most cases, these associations said that other associations would be better sources of information or that they had little to contribute regarding the use of marketing arrangements in the industry.

Finally, we conducted structured discussions with industry participants from all stages of production. We describe the

process we used for conducting these discussions in detail below.

1.3 PROCESS FOR CONDUCTING DISCUSSIONS WITH INDUSTRY PARTICIPANTS TO COLLECT QUALITATIVE INFORMATION

The protocol was designed to obtain information at different stages of the production process from farm to retail (including alliances that cover multiple stages of production and marketing).

The study team developed a protocol for conducting discussions with industry participants on the types of marketing arrangements used, the terms of the marketing arrangements, and the reasons for using particular types of marketing arrangements. The protocol was designed to obtain information at different stages of the production process from farm to retail (including alliances that cover multiple stages of production and marketing). We based this protocol on procedures used for similar types of information collection projects conducted by RTI and other members of the study team. We conducted no more than nine discussions at each stage of meat production and marketing to allow completion of this interim report in a timely manner.²

In preparing the protocol, we developed

- a list of individuals and organizations to be contacted for a discussion;
- a project information sheet describing the purpose of the project, information needed for the analysis, and an outline of the questions;
- discussion guides containing questions relevant to Parts A and B of the study; and
- a plan for summarizing the interviews and maintaining the confidentiality of respondents in using the information from the interviews.³

²The limitation on nine respondents at each stage of production is to comply with the requirements of the Paperwork Reduction Act. We tailored the basic set of questions to each species and stage of production and marketing.

³Prior to conducting the discussions, the procedures for maintaining respondent confidentiality were reviewed by RTI's Institutional Review Board (IRB). IRB reviews data collection protocols, before any human subjects are contacted, to ensure that appropriate human subject protections are incorporated into study procedures. IRB determined that this information collection, with the planned procedures, was exempt from full IRB review.

The project information sheets and discussion guides for the industry discussions are included in Appendix B.

In identifying participants, we sought to include the following groups:

- livestock producers
 - fed cattle and beef: cow-calf operations, backgrounding operations, and cattle feedlots;
 - hogs and pork: farrow-to-weaner operations, weaner-to-feeder operations, feeder-to-finished hog operations, and multiple stage operations; and
 - lambs and lamb: feeder lamb operations, finished lamb operations;
- packing plants
 - fed cattle,
 - finished hogs,
 - fed lambs, and
 - multiple species;
- meat processing plants that use beef, pork, or lamb inputs;
- meat wholesalers handling beef, pork, or lamb products;
- meat exporters; and
- grocery stores, restaurants, and other retailers.

We conducted a combination of in-person and telephone discussions at each level in the marketing chain. We conducted the discussions from December 2004 through March 2005. In total, we conducted discussions with 44 industry participants: 9 beef cattle producers and feeders, 5 beef packers, 8 hog producers and growers, 7 hog packers, 3 lamb producers and feeders, 4 lamb packers, 1 lamb breaker, 3 retail grocery chains, and 4 restaurant chains. These industry participants represented both small and large businesses and are located across multiple geographic regions. Despite repeated attempts, we were not able to schedule discussions with meat distributors and wholesalers or meat exporters.

Some of the discussions were conducted at the Cattle Industry Annual Convention in San Antonio, Texas, and the Pork Industry Forum in Orlando, Florida. Members of the team also attended the MeatExpo in Las Vegas, Nevada, and the American Sheep Industry Association Annual Convention in

Reno, Nevada, to better understand issues currently facing these industries.

The discussion guides contained general types of questions and discussion topics to address the needs of both Parts A and B of the study.⁴ For Part A, we included topics designed to collect qualitative information throughout the marketing chain from the farm level to final consumer on the following:

- available marketing methods, including types of spot markets and advance arrangements, and
- available pricing methods.

For Part B, we included topics in the discussion guide related to

- how terms of marketing arrangements have varied over time,
- the extent to which alternative marketing arrangements are available to different types of market participants, and
- the reasons why market participants enter into various types of arrangements (e.g., for reasons related to costs, efficiencies, risks, and quality).

We asked participants in the discussions to focus on current uses of alternative marketing arrangements, but we also asked about future expected uses of alternative marketing arrangements. The discussions provided information to assess qualitatively the incidence and frequency by which the various terms are used in each type of marketing arrangement. However, quantitative estimates of the incidence and frequency with which various terms are used for each type of marketing agreement will be obtained from the industry surveys conducted for later parts of the study.

After we conducted each discussion, we transcribed the findings of each individual discussion into an electronic format. We then electronically aggregated the responses by each topic of discussion for each type of respondent and prepared summaries of the findings for Section 4 of this report.

⁴The discussion guides were designed for unstructured, exploratory discussions. In contrast, the survey instruments for the surveys to be fielded later contain structured questions with primarily closed-ended and numeric responses.

1.4 USE OF INFORMATION IN PARTS A AND B OF THE STUDY

The study team used the information obtained as described above to address the study questions for Parts A and B of the study. Information from available published sources was used to develop the literature review in Section 3, to provide a better understanding of the industries for Parts A and B of the study, and to develop the data collection instruments for later parts of the study. In developing the data collection instruments, we developed categories for the analyses and lists of characteristics of products traded, types of marketing arrangements, terms of marketing arrangements, and reasons for using alternative marketing arrangements. We obtained a more in-depth understanding of these categorizations based on discussions during the pretest interviews. We include these categorizations and lists in Section 4 of this report. We also include definitions of terms developed for the industry survey questionnaires in Appendix A of this report.

Using the contract forms, we identified types of contracts used and the terms of these contracts. Summaries of these are included in Section 4. Discussions with trade associations pointed us towards other sources of information and also helped develop our understanding of market structure and types of marketing arrangements used. Finally, the discussions with market participants provided descriptive information that is presented in Section 4 and will provide the basis for better understanding the quantitative data that we will collect and analyze in later parts of the study.

1.5 ORGANIZATION OF THE REPORT

This interim report provides background information and descriptive results for Parts A and B of the Livestock and Meat Marketing Study. Section 2 provides a brief overview and description of the livestock and meat industries. Section 3 presents a summary of the relevant literature on spot and alternative marketing arrangements. Section 4 describes the findings of Parts A and B of the study for each livestock species and meat type. Section 5 provides a summary and preliminary conclusions for this interim report. Citations used throughout the report are provided in Section 6. Appendix A includes a glossary of terms, and Appendix B contains copies of the

materials used to conduct interviews with industry participants and trade associations.

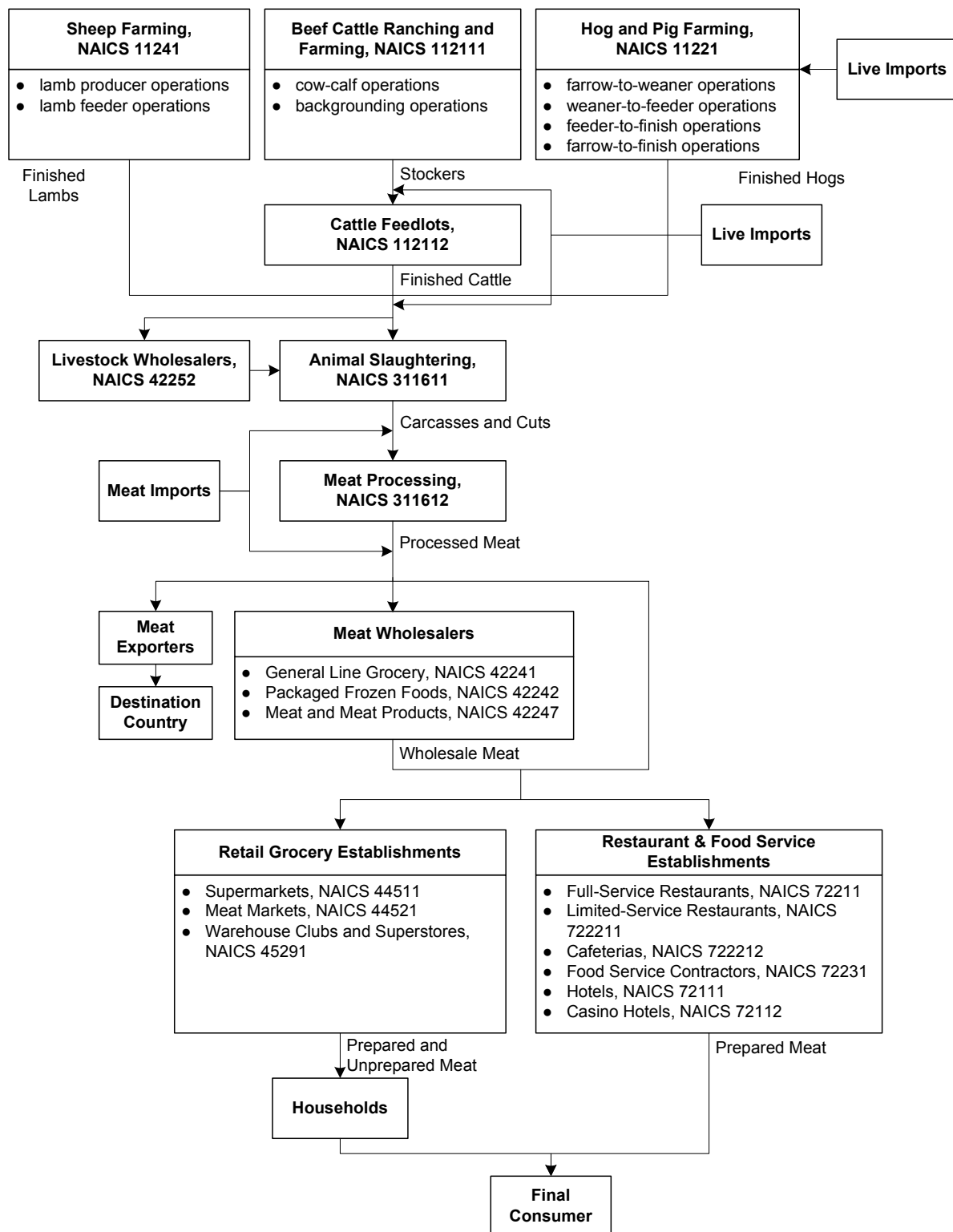
2 Industry Background and Assessment

The multiple stages of production in the beef, pork, and lamb industries may be combined through vertical integration or use of alternative marketing arrangements.

The production and marketing of meat encompass multiple production stages from farm to final consumer (Figure 2-1). At the farm level, cattle, hogs, and lambs are produced on separate types of farms and are usually produced at multiple locations, such as breeding operations, feeder operations, and finishing operations. Finished livestock are delivered for slaughter at establishments that may specialize in a single species, which is nearly always the case for large establishments, or at establishments that slaughter multiple species. Once livestock are slaughtered, carcasses and cuts from animals may be further processed at processing establishments that often use inputs from multiple species. Following processing, the distribution channels from wholesalers to retail establishments carry all meat types.

Vertical integration through direct ownership may combine multiple steps in the production process. Furthermore, marketing arrangements, which specify the terms of delivery and methods of pricing of livestock and meat, also combine multiple stages of production. As the industry has evolved, vertical coordination, vertical integration, and use of alternative marketing arrangements have increased. Incentives for increased vertical coordination and use of marketing arrangements include improving the flow of products and information about products among vertical production and marketing stages (Schroeder and Kovanda, 2003) and potentially reducing transactions costs.

Figure 2-1. Overview of the Meat Production Industries from Farm to Final Consumer



Note: NAICS = North American Industry Classification System.

The livestock and meat industries for each species included in the study differ substantially in terms of the structure of the production process, demand for final products in the marketplace, structure of the input and output markets, and types of marketing arrangements used. As background for the discussion in the later sections of the report, the basic characteristics of the industries for each livestock species and meat type are described below.

2.1 FED CATTLE AND BEEF

Current issues and changes facing the beef cattle industry relate to

- BSE found in North American cattle,
- the current stage of the cattle cycle,
- current strong demand for beef in the United States,
- the introduction of mandatory price reporting,
- proposed requirements for Country of Origin Labeling (COOL),
- the development of the National Animal Identification System (NAIS),
- increased use of nonprice vertical coordination, and
- increased concentration throughout the beef supply chain.

Several significant issues and changes will affect the near-term functioning of the beef cattle industry. In particular, closure of the U.S. border to imports of cattle from Canada and export restrictions on beef to the Asian Rim because of the discovery of bovine spongiform encephalopathy (BSE) in Canada and the United States have had a substantial effect. The first discovery of BSE in the United States was linked to Canada, but the second discovery was a case originating in the United States. The U.S. border was closed to Canadian cattle imports from May 2003 to July 2005. Asian rim borders were closed to U.S. beef exports in January 2004. However, most export markets reopened as of spring 2005, with the exception of Japan and South Korea.

Canada had previously been exporting approximately 70,000 to 100,000 animals per month to the United States primarily for slaughter. This supply was highly seasonal, but the trend had been increasing. Thus, the loss of these animals has resulted in significant tightening of cattle supplies within the United States.

Japan and South Korea had previously been importing \$1 to \$2 billion per year of beef products from the United States. This export reduction has resulted in lower prices for beef than would have otherwise been observed. Nonetheless, wholesale and retail prices remain relatively high because of both strong and growing domestic demand for beef and tight cattle supplies.

Improving domestic demand for beef is another significant factor affecting beef and cattle markets with the beef industry realizing its first increase in demand in 20 years in 1999. Since then, beef demand has been increasing, and consumers appear to be willing to consume more beef at higher prices. From 1980 to 1999, USDA data show that beef consumption per capita fell

from 76.4 lbs per year to 67.5 lbs per year, a decline of nearly 12 percent. During this time, inflation-adjusted prices fell 27 percent; if prices had not fallen, consumption would have decreased 50 percent according to the beef demand index constructed by the Research Institute for Livestock Pricing at Virginia Polytechnic Institute.¹ That is, consumers were willing to consume somewhat similar quantities of beef, only at substantially lower prices, indicating a decline in consumers' "willingness to pay for beef."

The stage of the cattle cycle is having a large effect on the markets for cattle and beef in the near term.

The stage of the cattle cycle is having a large effect on the markets for cattle and beef in the near term. The cycle changed from liquidation in 2003 and 2004 to rebuilding in 2005. Liquidation results in relatively large supplies of animals and low prices. Rebuilding results in relatively tight supplies of animals and high prices. In essence, cow-calf producers are reducing available supply by retaining heifers for breeding during periods of expansion.

The introduction of mandatory price reporting is another external event that has affected the industry. In 2001, the livestock industries changed from voluntary price reporting to a system where price reporting was mandatory and where individual firm actions were not revealed in the subsequent reported prices. An adjustment period occurred because some commonly used price series were no longer reported, and new series with changed market definitions were made available by USDA's Agricultural Marketing Service (AMS).

The beef industry is currently facing other issues related to government regulation. COOL and NAIS are both pending issues that will have a dramatic effect on the beef industry. COOL was introduced as part of the 2002 Farm Bill with the intention of providing consumers with information about where beef, lamb, pork, fish, perishable agricultural commodities, and peanuts are produced and processed. In April 2005, mandatory labeling of seafood and shellfish went into effect; however, all other commodities will not be affected until September 30, 2006, under current provisions of the law. NAIS was designed to allow the rapid containment of animal diseases. There was a strong move to implement mandatory identification after the

¹See <http://www.aaec.vt.edu/rilp/> for more information about the beef demand index constructed by the Research Institute for Livestock Pricing.

BSE and foot-and-mouth disease outbreaks in the European Union. USDA's Animal and Plant Health Inspection Service (APHIS), in conjunction with industry representatives, is determining the most practical technologies for implementation. APHIS is in the process of working with producers to establish premises identification numbers for places where animals may be located (USDA-APHIS, 2005a).

2.1.1 Stages of Beef Cattle Production

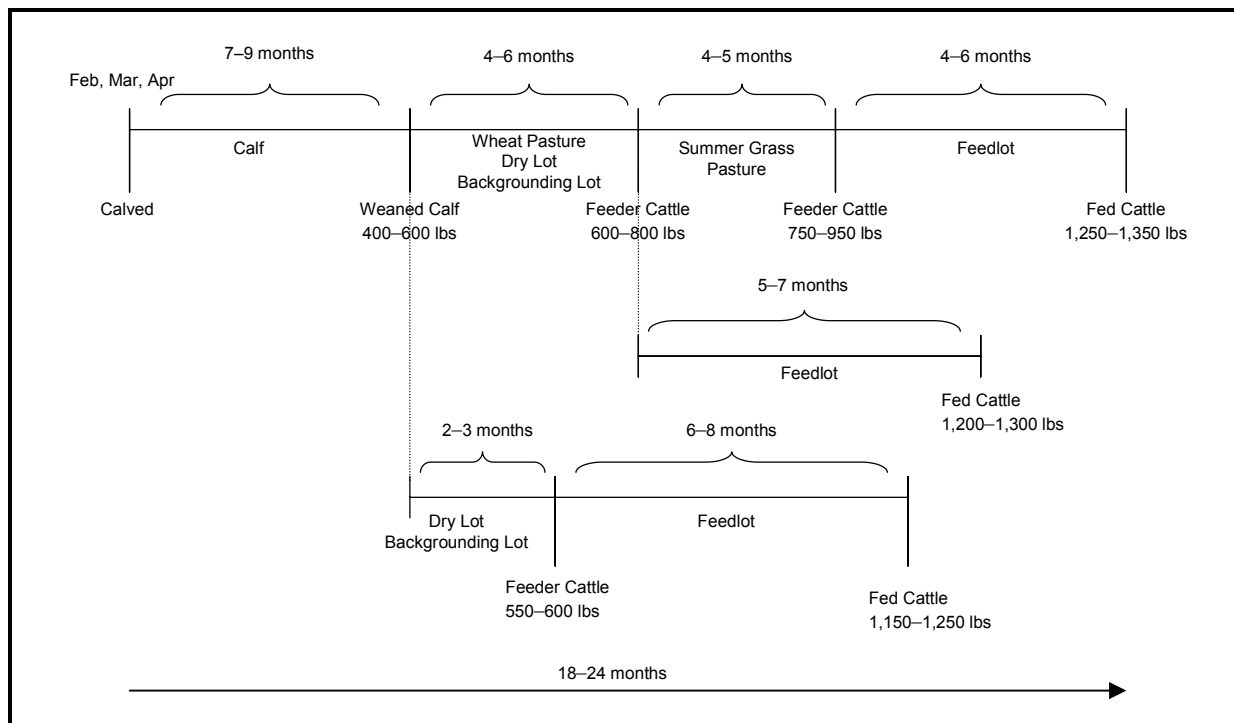
In beef cattle production, the production unit—the growing animal—and herd from which the animal is produced live out of doors and mainly consume forage. For the most part, animals are not confined under a roof and consume cellulose-based feed that is not the main feed source in other major meat animal production systems (e.g., pork and poultry).

In many regions of the country, calves are born primarily in the spring and graze pasture with the cow during the summer (Figure 2-2). Calves are weaned during the fall of their birth year and marketed at 400 to 600 pounds. These animals are referred to as calves or weaned calves in the marketing system. Some female animals (about 16 percent of total inventory) are held back or are not marketed and become breeding stock replacements.

The marketed weaned calves are backgrounded in preconditioning lots, backgrounded on backgrounding operations, placed on winter wheat pasture, or placed in other winter pasture systems. Animals may or may not be confined in a lot with other animals. Preconditioning lots and backgrounding lots may involve confinement, but pasture systems do not. Calves are fed forage or hay and some nutritional and protein supplements in confined operations. Grazing largely involves open-range feeding and some supplements. Backgrounding operations use inexpensive feed to add weight to the animal. At this stage, the animal primarily grows bone frame and some muscle, as opposed to heavy muscling and fat of later feeding stages.

Figure 2-2. Typical Cattle Production Timeline: Spring-Calved Beef Animal

The method of raising cattle can vary depending on the available resources and the desired finished weight.



Winter pasturing systems tend to be located in the southern United States, and winter wheat pasture systems are located in Kansas, Oklahoma, and Texas. Animals sold from these backgrounding enterprises are referred to as feeder cattle, yearlings, or stocker cattle. They weigh between 600 and 800 pounds and are marketed during the spring. At that time, the feeder cattle enter a feedlot or are placed onto summer pasture. Which path the animals take depends on the animal's size: smaller animals (stocker cattle) are pastured and larger animals are placed into feedlots. The price of high-energy feed, such as corn, also influences an animal's path. Expensive grain feed encourages additional grazing and fewer cattle being fed in feedlots. Summer pastured cattle are marketed in the fall as feeder animals and weigh between 750 and 950 pounds.

Pasture and forages, which are cellulose-based feed, are used to grow the animal. This feed is relatively inexpensive and is not usable by nonruminant animals. A wide array of feeds is used, but most are grass-based hays. However, protein and energy are not sufficient in forages for the animal to develop muscle and deposit fat. Thus, some high-energy feed is needed

The length of the feeding period depends on the cost of feed, the price of fed animals, the premiums or discounts associated with meat quality, and the size of the animal entering the feedlot.

close to slaughter. Some grass-fed animals are produced and marketed in the United States, but the production timeline is significantly longer (typically 1 year), and meat from grass-fed animals has a stronger flavor than is generally acceptable to U.S. consumers.

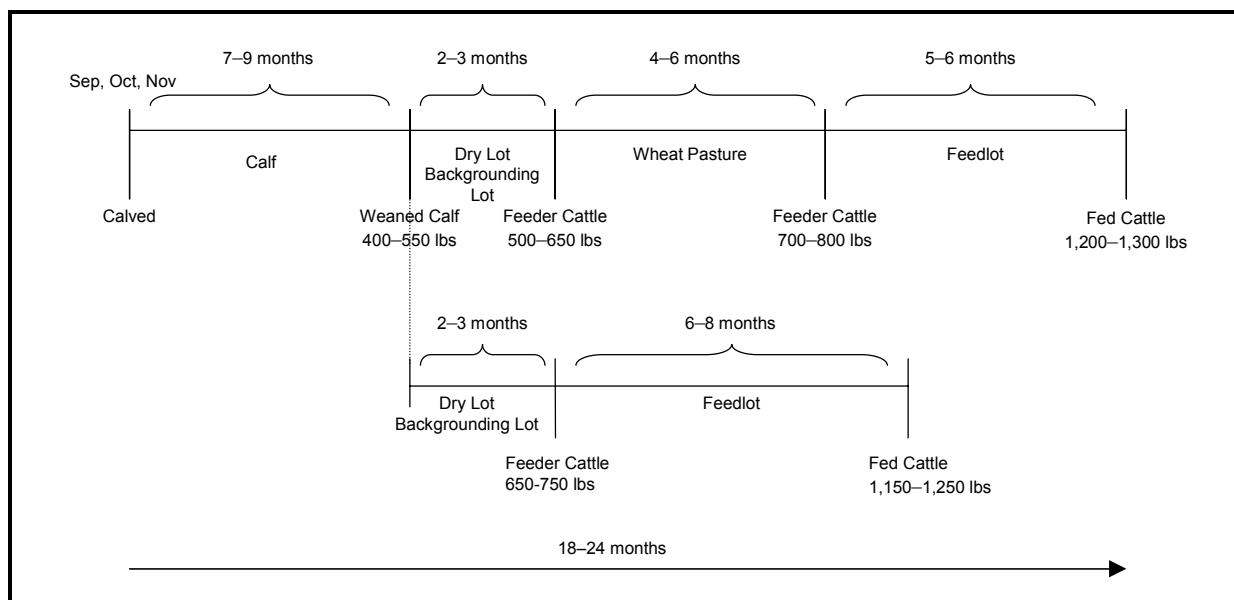
Animals that enter the feedlot in the spring as yearlings or the fall as feeder cattle are fed a high-energy ration for 4 to 6 months. The length of the feeding period depends on the cost of feeder cattle, the cost of feed, the price of fed animals, the premiums or discounts associated with meat quality, and the size of the animal entering the feedlot. Corn or corn by-products are the main cattle feed, but sorghum and barley are also often used. The diet also contains some forage to support the ruminant animal stomach and some high-protein feed, such as soybean meal. Again, a large variety of roughage feeds is used, including grass hays, corn silage, green-chopped hays, sugar beet pulp, and citrus and other fruit pulps. Cattle-feeding operations tend to locate near inexpensive sources of forage feeds and energy feeds.

The above discussion describes the primary beef production system. However, in some beef cow-calf operations, cows calve during the fall. These operations are in the minority and tend to be located in the southern United States (see Figure 2-3). Some calving operations are year-round, but these are atypical. Fall calving operations attempt to capture counter-seasonal patterns in calf prices. Cows are calved in the fall, and calves graze winter grass pastures with supplemental feed and are sold as weaned calves in the spring to producers that place the animals on summer pasture, or they are retained by the producer for summer pasture grazing.

After grazing for the summer, feeder animals usually go into preconditioning lots or backgrounding lots for 1 to 2 months and then into a feedlot and on feed during the winter. The path the animal takes depends on the animal's size. Small animals are preconditioned in a lot, whereas larger animals may go to the feedyard. Animals are fed 4 to 6 months in the feedlot. The feeding schedule is the same as for cattle that were spring-born calves. Marketing fed cattle that were fall-born calves is similar to the marketing of spring-born calves.

Figure 2-3. Typical Cattle Production Timeline: Fall-Calved Beef Animal

Changing calving season can allow producers to use different resources.



Most slaughter enterprises are combined with fabrication enterprises that process the carcass into cuts that are a portion of the carcass or specific muscles, but both parts of the enterprise are likely separate profit centers.

After feeding a high-energy ration, fed cattle are marketed as fed or finished steers and heifers. These cattle are marketed to businesses that specialize in slaughter of live animals, production of beef carcasses, and animal by-product processing and marketing. Most slaughter enterprises are combined with fabrication enterprises that process the carcass into cuts that are a portion of the carcass or specific muscles, but both parts of the enterprise are likely separate profit centers. Cuts are referred to as boxed beef and are vacuum-sealed in plastic bags and packaged in cardboard boxes.

***Quality grade** refers primarily to carcass maturity and amount of intramuscular fat.*

Carcasses are inspected for wholesomeness by USDA's Food Safety and Inspection Service (FSIS) or by a state government inspection system and may be quality graded by USDA's Agricultural Marketing Service (AMS). Federal inspection by FSIS is required for shipment of meat in interstate trade. Grading is not required but is usually performed. Carcasses are Quality Graded and Yield Graded. **Quality grade** refers primarily to carcass maturity and amount of intramuscular fat. Mature carcasses cannot receive a high-quality grade. USDA Quality Grades are Prime, Choice, Select, and Standard. Cattle that will grade Standard are typically not graded and are referred to as "No-Roll" because the USDA Quality Grade was previously rolled on to the fat cover the length of graded

***Yield grade** is the amount of meat or salable meat in the carcass.*

carcass with an ink wheel. Connective tissue in meat is more substantial in older animals, and meat flavor may be stronger and “gamier.” Intramuscular fat, the fat tissues that are within the muscle as opposed to fat layers between muscles, impart mild flavors and hold moisture in cooking. Thus, intramuscular fat is desirable and results in a higher quality grade. **Yield grade** is the amount of meat or salable meat in the carcass. USDA Yield Grades are numbered 1 to 5. Increases in the amount of fat cover between the hide and carcass and fat deposits close to edible organs result in a lower yield grade. Smaller muscles also result in lower yield grades.

Substantive trade-offs affect costs and revenue associated with beef production. Feeding cattle longer results in heavier animals with more muscle and fat and more intramuscular fat and also higher feeding costs. Because of declining returns to feeding, the main trade-off is to feed the animal to the point where muscle gain and increased revenue equal the additional costs. A second trade-off is that longer feeding results in higher-quality grades but lower yield grades.

Another primary issue in cattle feeding is that individual cattle are not managed.² Thus, the economics associated with individual animal production must be aggregated across the distribution of the animals in the pen. This is sometime referred to as pen-level economics. Cattle are also sold in pen-level and multiple-pen units. Some nonstandard cattle from a pen-level transaction are sorted, but for the most part, all the cattle are bought in a single transaction.

***Cow-calf operations** may be only cattle businesses or the business may diversify into other ranching enterprises, such as haying, and other farming operations, such as row crops.*

Cow-calf operations may be cattle businesses only or the business may diversify into other ranching enterprises, such as haying, and other farming operations, such as row crops. The diversification choice depends largely on the environment. Western cow-calf operations tend to be only cattle operations, with some haying if irrigation water is available. Midwestern and southern cow-calf operations tend to be combined with farming enterprises in which cattle graze on land that cannot be used for row crops.

²Some individual management systems, such as MicroBeef’s Electronic Cattle Management System, are being introduced, but these systems are not the industry standard.

Stocker cattle operations or backgrounding operations are enterprises with surplus forage.

Stocker cattle operations or backgrounding operations are enterprises with surplus forage. Rarely are backgrounding operations single enterprises. It is more cost-effective to move the cattle to the forage than the forage to the cattle. The most common practice is to purchase yearlings for grazing on summer pasture so that the enterprise can essentially market cheap grass through growth on a ruminant animal. Some weaned calves are marketed in the fall because summer pasture will not be available until the following spring. Large proportions of these animals go onto winter wheat pasture in the southern High Plains, followed by grass pasture in the southeastern United States. However, calves can be wintered anywhere with substantive pasture, such as dormant grass with high available protein, but may require supplemental feeding and hay. Many but not all calves in the northern states are shipped south for pasturing.

Cattle-feeding operations are concentrated in the southern Plains States, High Plains States, and the Midwest.

Cattle-feeding operations are concentrated in the southern Plains States, High Plains States, and the Midwest. Feeder cattle move from pasture and backgrounding systems to feedlots in these regions. Large numbers of animals are confined together in these feeding operations, but the animals are also in the outdoors. Cattle-feeding operations are specialized operations. However, the operations may be part of a larger enterprise that grows and manufactures feed. These feedlots grow a portion of their feed supplies, such as corn silage and other forages, and purchase some of the grain needed for feeding. Many cattle-feeding operations own several feedyards. These feedyards are operated by on-site management, but central management may make decisions and capture economies in feed purchasing, feed manufacturing, animal procurement and marketing, financing, and risk management.

Recent changes have occurred in industry standard production systems. Over time, the production timeline has shrunk from 24 months to a range of 18 to 24 months. In the past, most yearlings were grazed on summer pasture, placed on feed the following fall, and marketed mainly in the spring. This one-size-fits-all system has evolved to capture seasonal price advantages. The change has resulted in a variety of preconditioning and backgrounding systems, some of which are in lots, where the animal is grown and marketed faster.

Vertical coordination and vertical integration in the beef production system are typically not done by combining stages, as seen in other industries.

Vertical coordination and vertical integration in the beef production system are typically not done by combining stages, as seen in other industries. The land and resource base needed in these outdoor and forage-based systems is very large. The industry also tends not to be vertically integrated (i.e., packers tend not to own feedlots, backgrounding operations, or cow-calf operations). Also, feedlots tend not to own backgrounding operations or cow-calf operations. The capital requirements are too large and the risk can be very systematic and positively correlated. Even for the vertical integration that does exist, these types of enterprises operate as separate profit centers. For example, the largest investors in National Beef Packing also have cow-calf operations, but these business entities are not combined.

Beef producers have increased the level of vertical coordination through marketing agreements, alliances, retained ownership, part-ownership, and partnerships with downstream producers and processors.

Beef producers have increased the level of vertical coordination through marketing agreements, alliances, retained ownership, part-ownership, and partnerships with downstream producers and processors. Likewise, downstream processors have achieved coordination through part-ownership, partnerships, and profit sharing with other downstream processors, upstream producers, and cow-calf operations. There are also alliances with some retailers and food service companies. Partnerships largely take the form of providing financing or partial payment for animals. For example, cattle-feeding operations might provide partial payment to a backgrounding or cow-calf operator for feeder animals. The feedlot operation and the backgrounder then both own the pen of cattle jointly in proportion to their financial shares. The feedlot and the backgrounder pay their portions of the feed and other feeding costs and receive their portion of payment for the fed animals. This arrangement does not require the feedlot to have as much capital resources on hand, and the backgrounder maintains some capital interest. This arrangement also allows the backgrounder to get paid based on the performance of the animals in the feedlot as well for the performance in the backgrounding operation.

Additional information and additional economic incentives may be realized in the coordinated system when compared with the cash market system where arms-length transactions occur between the backgrounding and feeding operations. This coordination attempts to address potential market failures where there is important but insufficient information about the product being transacted in the cash marketing system.

Substantial profit sharing occurs in some arrangements between cattle feeding and processing businesses.

A second useful example is the substantial profit sharing that occurs between feedlots and processing enterprises. Feedlots now own a portion of cattle further downstream into the meat production stage. The feedlot is paid based on the performance of the cattle in terms of sales revenue to the processor. The feedlot is also paid based on the cost-efficiency of the processor, so the feedlot is willing to provide services that contribute to more efficient plant operations. If the additional service commands a premium, then the feedlot realizes a portion of the premium. Likewise, the processor is paid based on the cost and performance of the animals in the feedyard. Processors want the animals fed to the point where marginal returns equal marginal costs and have the incentive to coordinate with the feedlot so this goal is accomplished.

In summary, partnership arrangements or any arrangement where some ownership is carried through the supply chain provides information and direct incentives that are not transparent in cash market transactions.

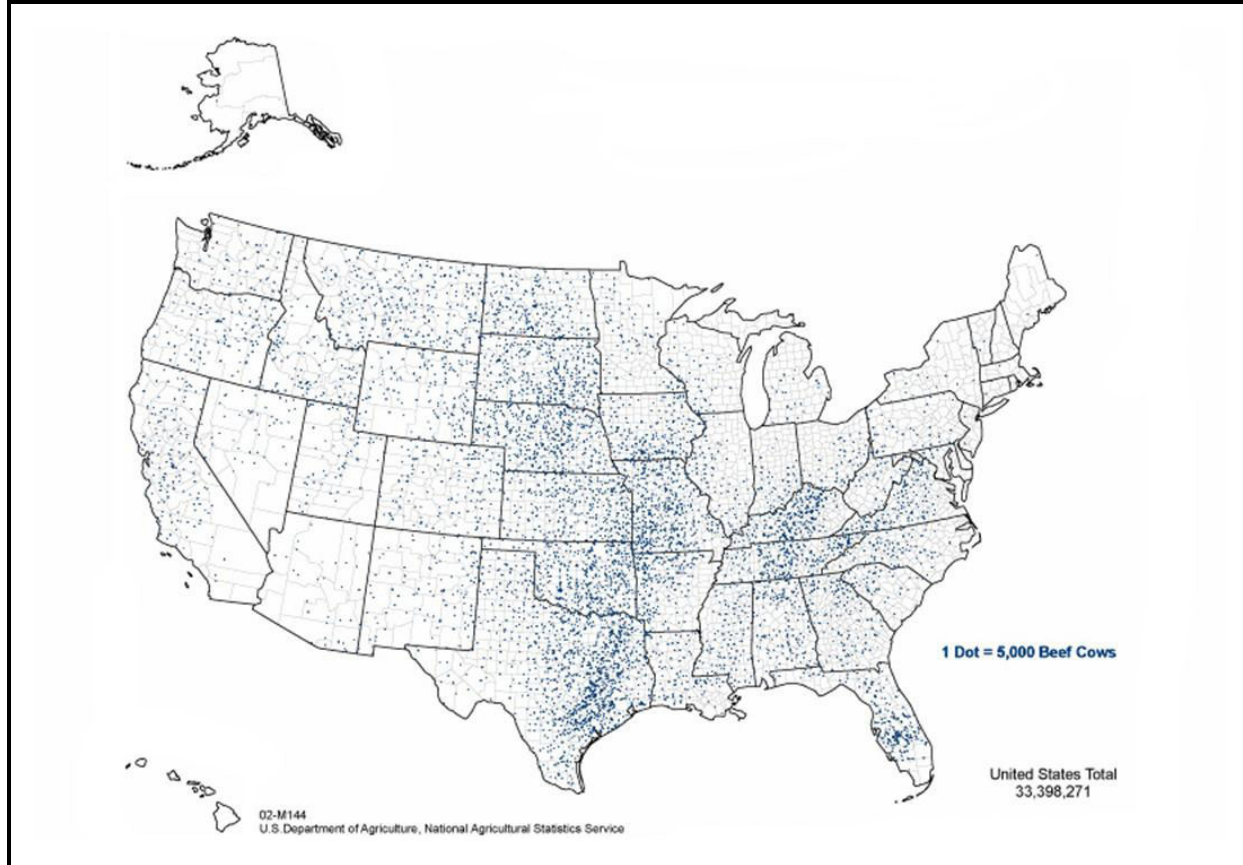
2.1.2 Location of Beef Cattle Operations

Cow-calf operations, as illustrated in Figure 2-4, are widely distributed across the United States. The limiting resources are pasture and forage. If pasture is available, then cattle will be grazed. Cow-calf operations are concentrated in the Midwest and southern United States because the climate and rainfall are supportive of pastures in these regions. Cow-calf production is also present in the western United States and is important to western agriculture, but the climate does not support extensive forage production.

Figure 2-5 shows that cattle-feeding operations are concentrated in the southern Plains States, High Plains States, and the Midwest. Large numbers of animals are confined in these feeding operations. Cattle perform well on feed in the high-and-dry climate of the High Plains. Cattle feeding moved to the High Plains from the Corn Belt with the development of irrigated row crop agriculture over the aquifers in the High Plains. However, these regions remain corn-deficient and receive shipments of grain from the Midwest for cattle feeding. The improved performance of animals on feed out-weighs the transportation costs. The dry climate also makes animal waste management less of an issue than in the wetter and more populous Midwest and Corn Belt states.

Figure 2-4. U.S. Inventory of Beef Cows, 2002

Cow-calf operations are located throughout the country but are concentrated in the Midwest and South.



Source: U.S. Department of Agriculture, National Agricultural Statistics Service. 2004b. "2002 Census of Agriculture." Washington, DC: USDA. <<http://www.nass.usda.gov/research/atlas02/>>.

Cattle slaughtering and processing operations are located close to cattle-feeding regions (Figure 2-6). Given advances in technology, it is more economical to move meat to people than to move cattle to people. Meatpacking operations that are not located close to cattle-feeding operations are located in regions with larger numbers of beef and dairy herd animals. Most cow slaughter plants are located in Wisconsin and Pennsylvania to be close to dairy production in the northeast and the southeast.

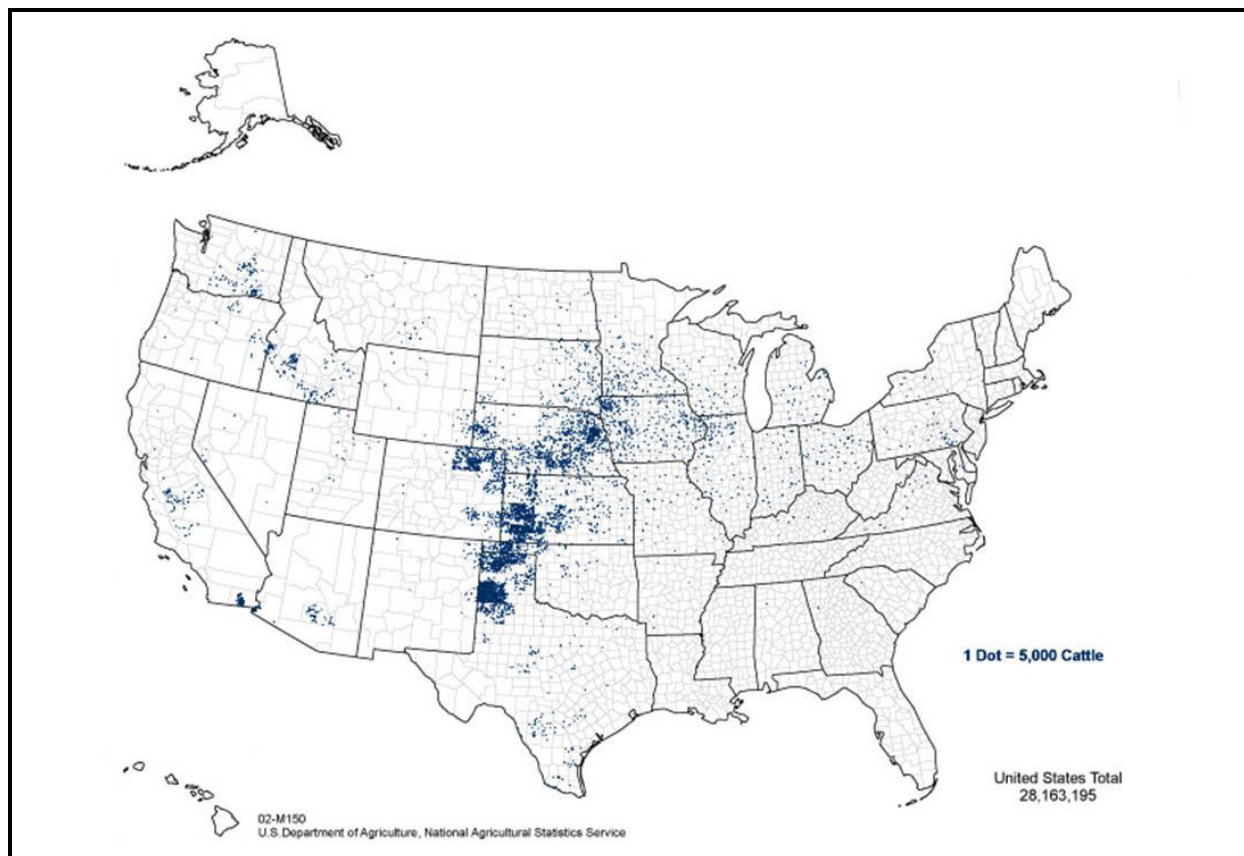
2.1.3 Trends in Beef Cattle Operations

The cyclical nature of cattle production is evident based on trends in the number of cattle slaughtered.

Prior to the 1970s, animal inventories trended strongly upward. However, beef animal inventories have been decreasing steadily since then. Two cattle cycles ago, there was a large "bust" phase of the cycle with resulting very large inventories, very low prices, and substantial losses. Beef cow inventories have declined steadily since the subsequent

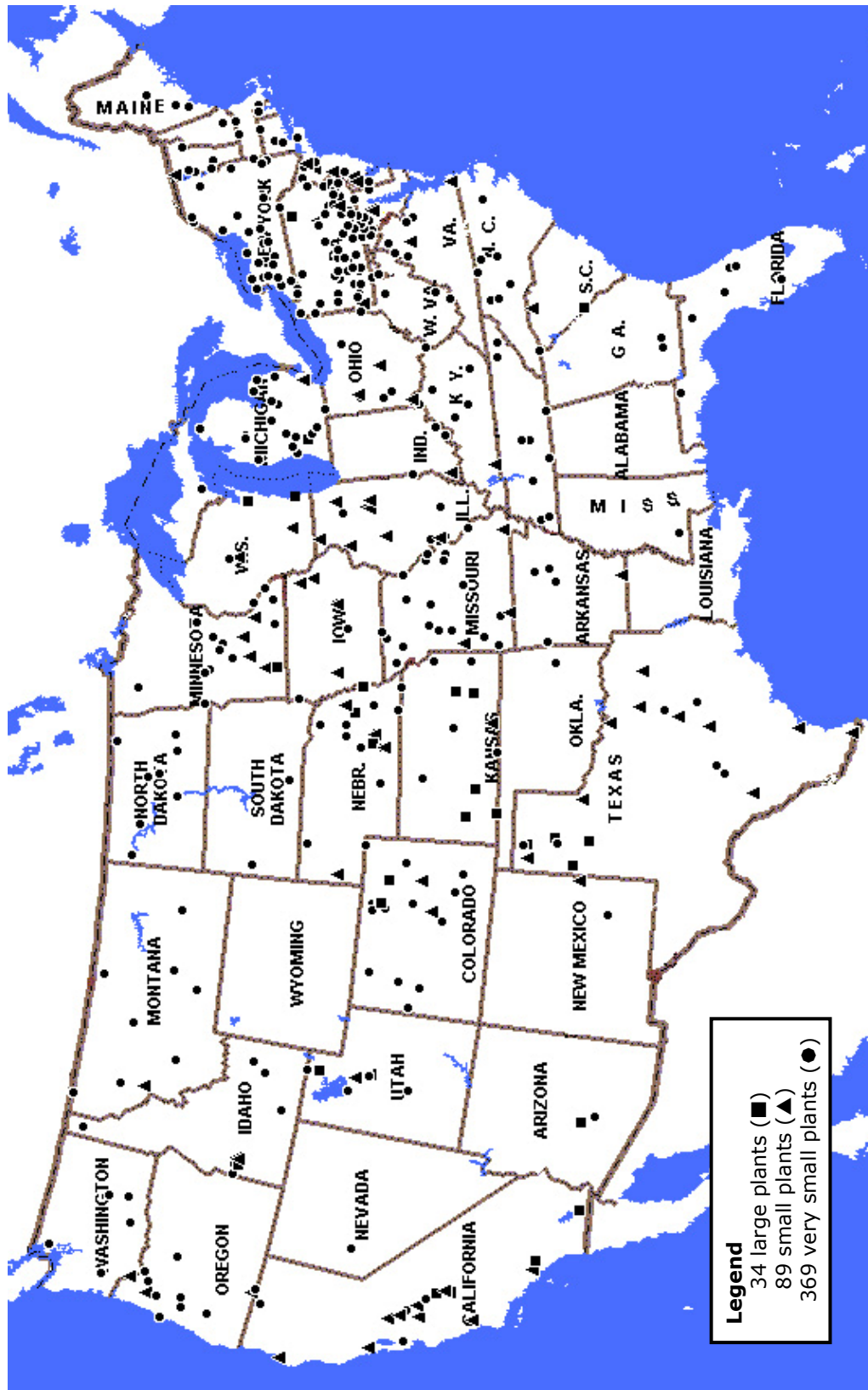
Figure 2-5. Number of Cattle on Feed Sold, 2002

Cattle feeding is concentrated in the Plains States.



Source: U.S. Department of Agriculture, National Agricultural Statistics Service. 2004b. "2002 Census of Agriculture." Washington, DC: USDA. <<http://www.nass.usda.gov/research/atlas02/>>.

liquidation. Beef production—pounds of beef produced and marketed—declined initially but has been relatively stable to exhibiting moderate growth since the late 1970s. Recently, during the immediate past liquidation phase of the cattle cycle and with record low corn and other feed prices, beef production achieved new record highs. Figure 2-7 shows the change in cattle inventories during the most recent cattle cycle. The cyclical nature of cattle production is evident based on trends in the number of cattle slaughtered. As seen in Figure 2-8 the number of steers and heifers slaughtered declined during the initial buildup phase (1990–1992) and then gradually increased throughout the herd buildup phase. Because of the biological lags in production, steer and heifer slaughter typically does not begin to decline until after breeding herds have started to be liquidated.

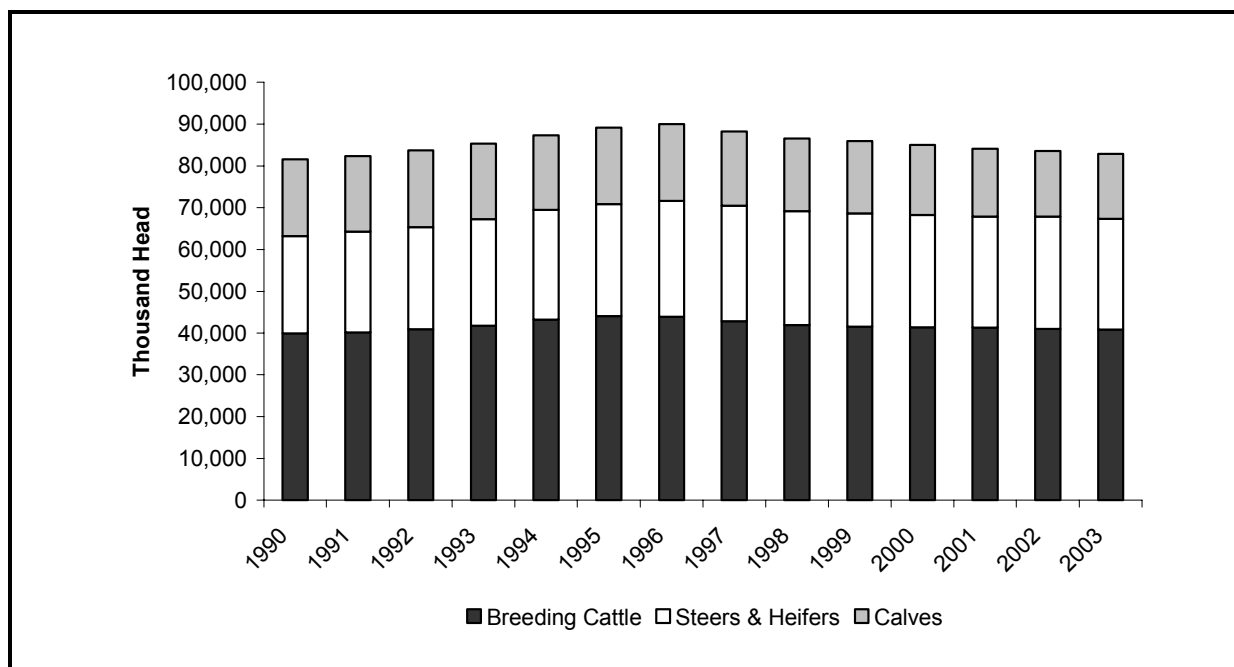
Figure 2-6. Location of Federally Inspected Plants that Slaughter Steers and Heifers^a

^aPlants that slaughtered at least 50 head of steers and heifers in FY2004 (October 1, 2003 through September 30, 2004) are included. Of 492 plants, 34 are classified by FSIS as large, with 500 or more employees; 89 are classified as small, with 10 to 499 employees; and 369 are classified as very small, with fewer than 10 employees or less than \$2.5 million in annual sales. Plants in Alaska (2) and Hawaii (7) are not shown.

Source: RTI International. 2005. Enhanced Facilities Database. Prepared for the U.S. Department of Agriculture, Food Safety and Inspection Service. Research Triangle Park, NC: RTI.

Figure 2-7. U.S. Cattle Inventory, January 1, 1990–2003

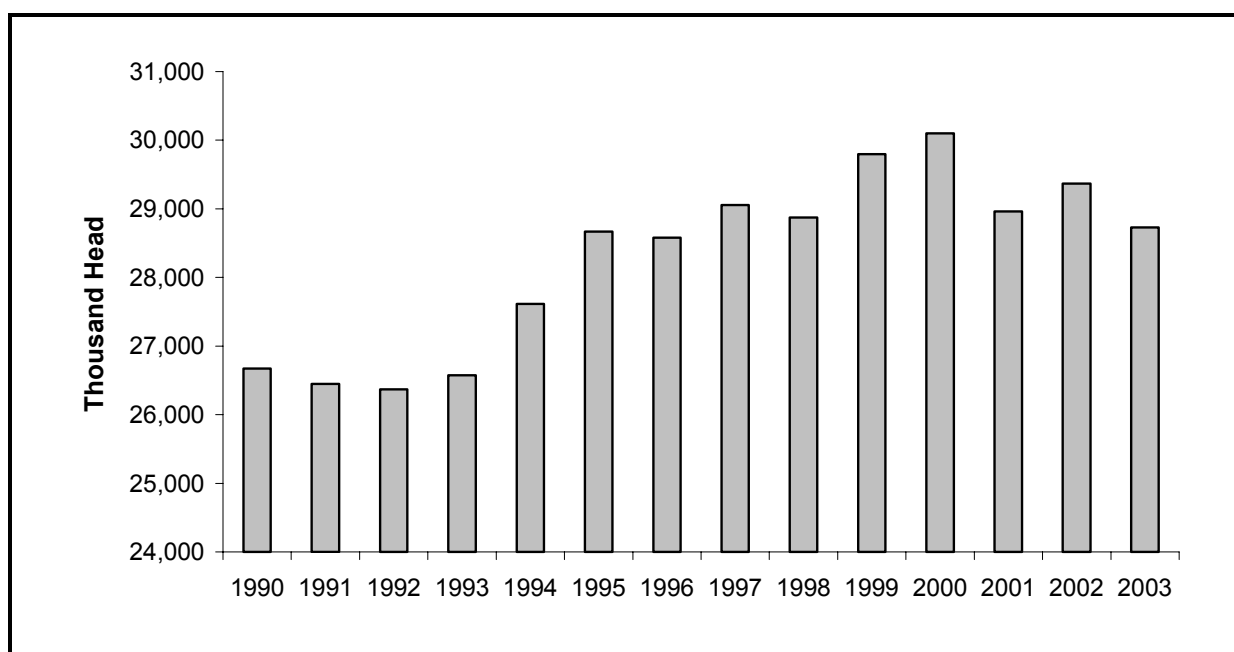
Cattle inventory categories include breeding cattle (beef cows, beef heifers, and bulls), steers and heifers (steers over 500 pounds and heifers other than those considered beef heifers), and calves. Milk cows and dairy heifers are not included in this figure.



Source: U.S. Department of Agriculture, Economic Research Service. 2004g. "Red Meat Yearbook." Stock #94006. Washington, DC. <<http://usda.mannlib.cornell.edu/data-sets/livestock/94006/>>.

Figure 2-8. U.S. Commercial Heifer and Steer Slaughter, 1990–2003

Commercial steer and heifer slaughter includes animals slaughtered at federally inspected and nonfederally inspected plants but does not include animals slaughtered on the farm.



Source: U.S. Department of Agriculture, Economic Research Service. 2004g. "Red Meat Yearbook." Stock #94006. Washington, DC. <<http://usda.mannlib.cornell.edu/data-sets/livestock/94006/>>.

Steady beef production with declining cattle inventories is evidence of improved per-animal productivity through new genetics and implant technology. Liveweights and carcass weights have been increasing steadily for the past 30 years. Industry experts conclude that weights began to increase with large-scale introduction of Continental breed cattle into the largely English breed U.S. herd. Introduction of these breeds began in the 1970s and was largely complete by the late 1980s and 1990s. Weights have continued to increase because of within-breed improvements in productivity and the use of growth promotants or implants.

Implants are typically hormonal compounds that result in approximately 25 additional pounds per implant used. Implants can be used in calves and stockers and used multiple times in fed cattle. Use of four implants is typical, but implants must be withdrawn (or not used) 30 days prior to slaughter. Implant technology can result in 100 pounds of additional live animal and 62 to 64 pounds of additional carcass weight.

Feedlot operations, backgrounding operations, and cow-calf operations are all becoming larger.

Farming and ranching operations are becoming larger, and cattle production is no exception. Feedlot operations, backgrounding operations, and cow-calf operations are all becoming larger. However, the cow-calf and backgrounding operations are also becoming more dichotomous. Because cow-calf and backgrounding operations can be part of a diversified operation, a large portion of very small producers remains. The average herd size in the United States is fewer than 50 cows. These very small operations market approximately one third of the weaned calves. A very small number of very large operations sell a majority of the calves. Unlike other farming enterprises, small cow-calf operations are not disappearing quickly. This is likely because the capital costs are relatively low for cow-calf operations, and animals use marginal land that has few alternative uses.

Cattle feeding has shifted steadily to the Great Plains over time. In 2001, feedlots in Colorado, Kansas, Nebraska, and Texas accounted for nearly 80 percent of all fed cattle marketings compared with 49 percent in 1974. Large feedlots with capacities greater than 32,000 head handled 42 percent of the volume in 2001 compared with 19 percent in 1974. Most of this shift came at the expense of small feedlots. Furthermore, the

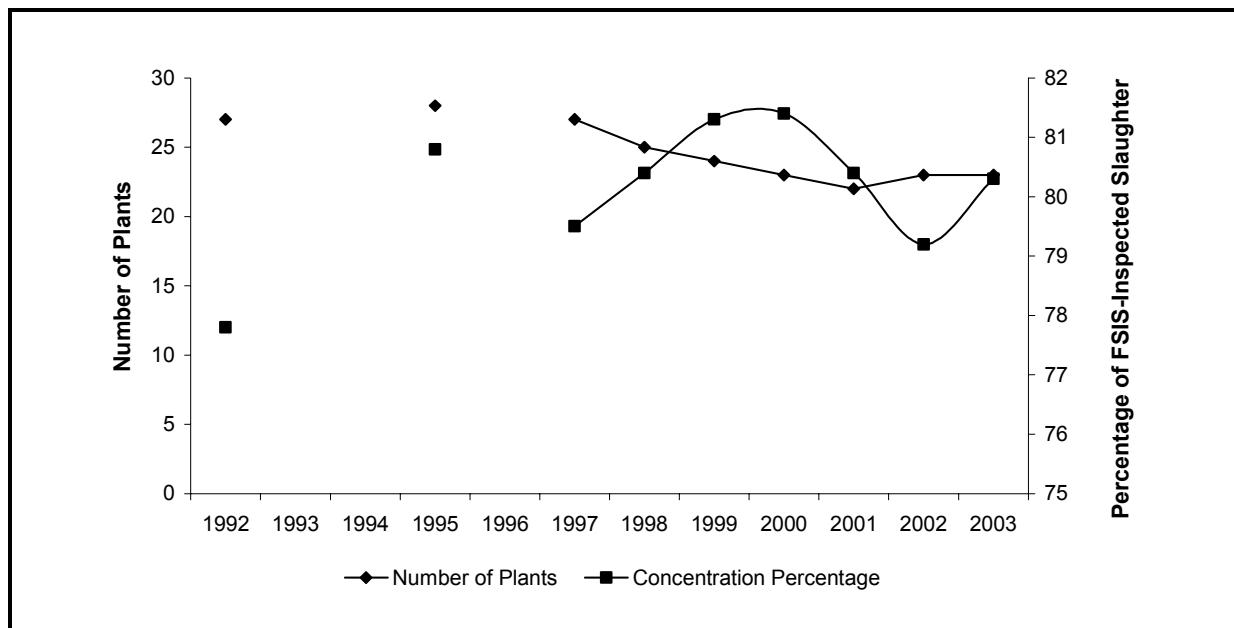
largest packing plants interact closely with large commercial feedlots.

Concentration in the beef packing industry increased sharply in the late 1980s and early 1990s but has been relatively stable since then.

Four meat packers slaughter and process over 80 percent of the fed cattle marketed in the United States (Figure 2-9). All four of those packers own multiple plants, and three slaughter and process multiple species of animals. Concentration in beef packing increased sharply during the wave of mergers in the late-1980s and early-1990s as declining demand forced beef packers to seek cost savings through economies of scale.³ However, since then the level of concentration has been relatively stable to slightly declining. Concentration levels in boxed beef processing are slightly higher than for fed animal slaughter.

Figure 2-9. U.S. Steer and Heifer Packer Four-Firm Concentration Ratio (CR4), Selected Years 1992–2003

The CR4s show the percentage of all steers and heifers that were slaughtered at plants owned by the four largest firms during the respective year. The total number of plants operated by those firms is also included. Percentages are based on total federally inspected slaughter numbers.



Source: U.S. Department of Agriculture, Grain Inspection, Packers and Stockyards Administration. 2004b. "Packers and Stockyards Statistical Report." SR-04-1. Washington, DC: USDA.

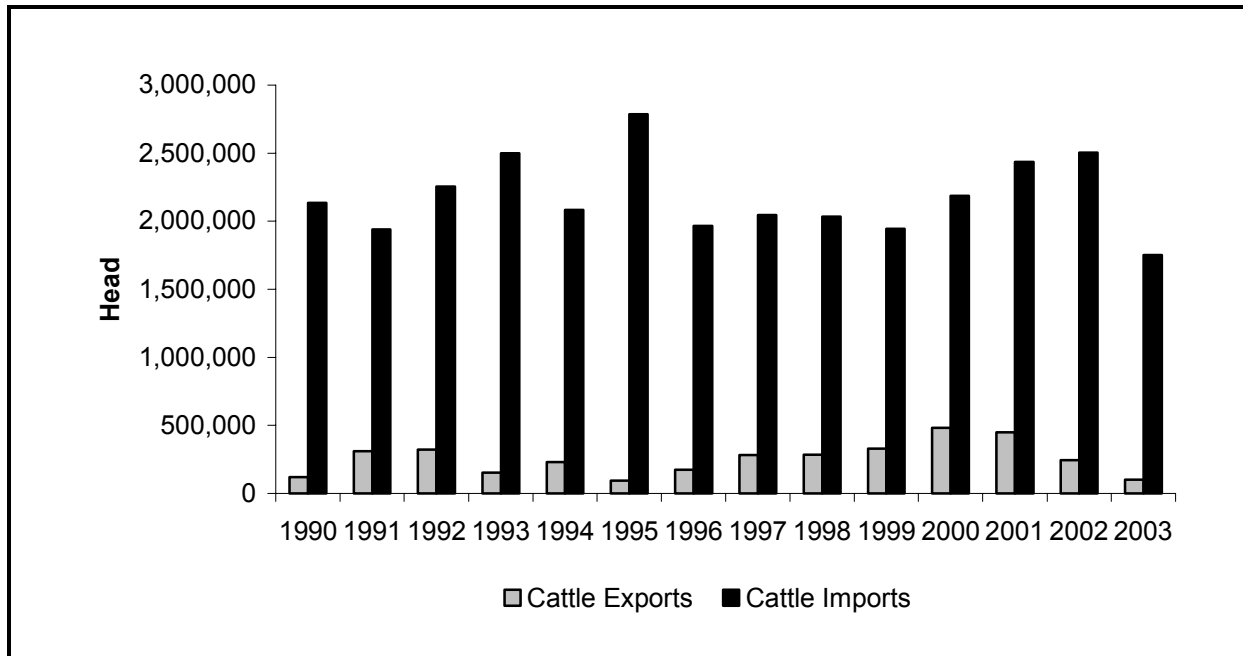
³Concentration refers to the portion of industry volume accounted for by the largest firms. The four-firm concentration ratio (CR4), which is a common measure of concentration, is the summation of the market shares of the four largest firms.

2.1.4 Imports and Exports of Cattle and Beef

The United States is a net importer of live cattle (Figure 2-10). As discussed earlier, recent trade restrictions have altered the international market, but the United States has traditionally imported live cattle from Canada and Mexico. These cattle are imported as finished cattle ready for immediate slaughter and feeder cattle that will be fed out in domestic feedlots. Very few live cattle are exported.

Figure 2-10. Total U.S. Cattle Imports and Exports, 1990–2003

The United States is a net importer of live cattle. Live animal trade is typically restricted to North America.

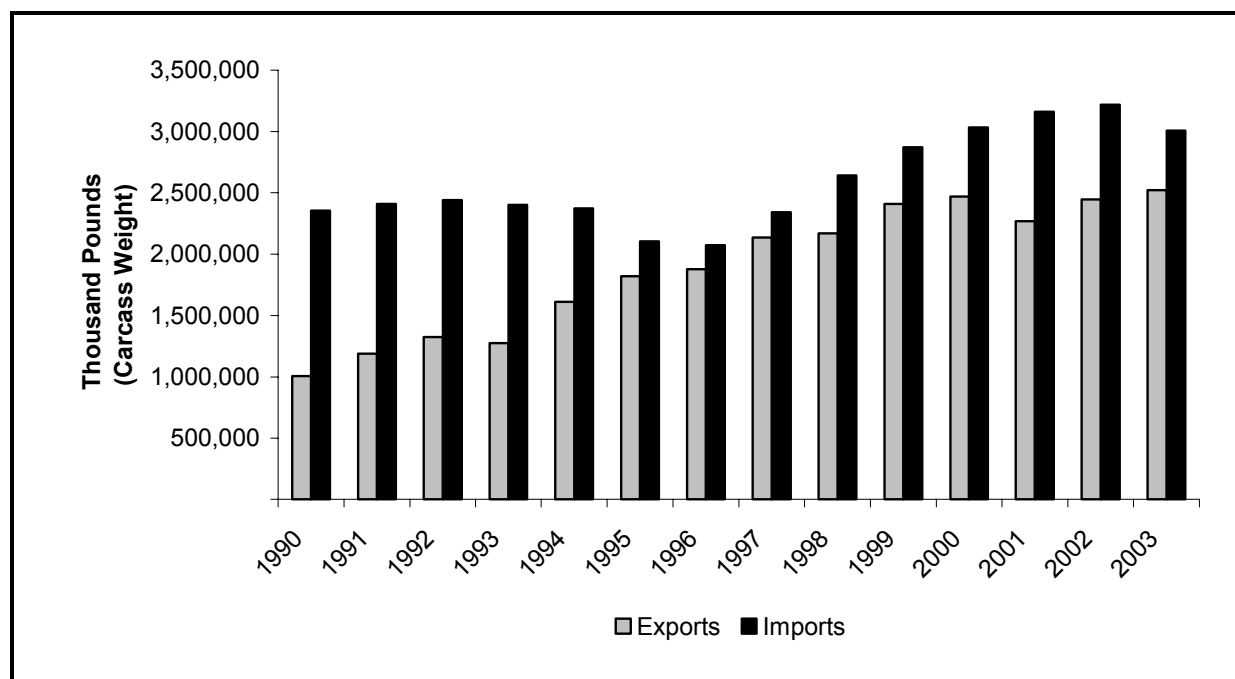


Source: U.S. Department of Agriculture, Economic Research Service. 2004g. "Red Meat Yearbook." Stock #94006. Washington, DC. <<http://usda.mannlib.cornell.edu/data-sets/livestock/94006/>>.

In addition to imports of live cattle, the United States is a net importer of beef (Figure 2-11). In 2003, beef imports were approximately 11 percent of U.S. beef consumption, and beef exports were approximately 10 percent of U.S. beef production (USDA-ERS, 2004g). Canada has been a growing supplier of beef to the U.S. market, but the majority of imports are from New Zealand and Australia. Grass-fed beef produced in Australia and New Zealand is much different from grain-fed beef produced domestically. Much of this beef is used in processed products, particularly ground beef (USDA-ERS, 2004b).

Figure 2-11. Total U.S. Beef and Veal Imports and Exports, 1990–2003

The United States is a net importer of beef and veal. Canada, Australia, and New Zealand are the primary sources of imported beef and veal. Mexico, Japan, and Canada are the primary destinations for U.S. exported beef and veal.



Source: U.S. Department of Agriculture, Economic Research Service. 2004g. "Red Meat Yearbook." Stock #94006. Washington, DC. <<http://usda.mannlib.cornell.edu/data-sets/livestock/94006/>>.

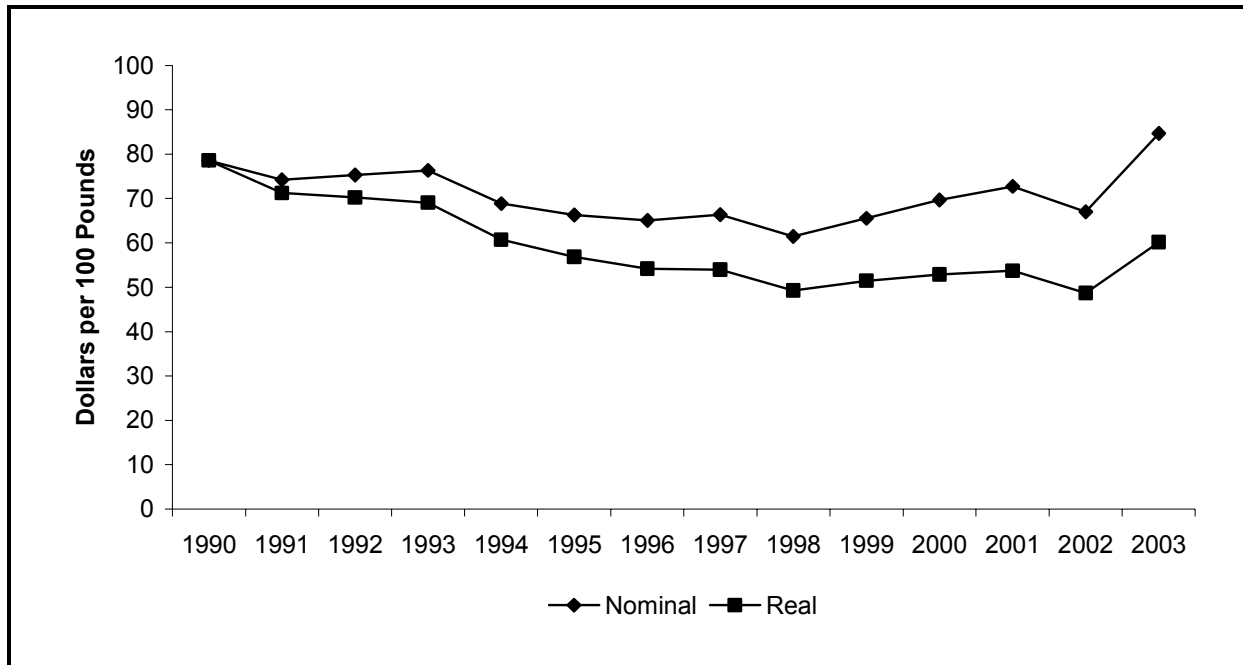
2.1.5 Cattle Prices

Fed-cattle prices have been the subject of considerable discussion. Some cattle producers are concerned that greater market concentration and the use of captive supplies have allowed meatpackers to bid for cattle at lower prices. Other industry observers hold that technological change and cost minimization are the forces driving change in the industry and that the impact of concentration on cattle prices has been minimal. There has also been a reduction in the number of cattle transacted via traditional cash or spot markets. The decreased number of cattle traded in the traditional spot markets has spurred debate about price discovery and determination. Many of the prices used as base prices in formulas and as benchmarks for price negotiations are now published in the daily and weekly market reports provided by the USDA-AMS under mandatory price reporting.⁴ Figure 2-12 provides an example of one of the price series now reported by AMS. Recently, the real price of slaughter steers increased substantially after declining throughout the 1990s.

⁴See Section 4.2 for additional information on cattle pricing.

Figure 2-12. Slaughter Steer Price, Choice, Yield Grade 2-4, Nebraska Direct, 1,100–1,300 Pounds, 1990–2003

Direct prices are the prices paid for animals in a private transaction between producers and packers. Real prices are equal to nominal prices adjusted (deflated) to account for inflation.



Note: Prices were deflated by the consumer price index for all urban consumers (1990 = 100) (U.S. Bureau of Labor Statistics. "Consumer Price Index-All Urban Consumers, US All Items." <<http://data.bls.gov/cgi-bin/surveymost?cu>>. Accessed April 18, 2005.)

Source: U.S. Department of Agriculture, Economic Research Service. 2004g. "Red Meat Yearbook." Stock #94006. Washington, DC. <<http://usda.mannlib.cornell.edu/data-sets/livestock/94006/>>.

2.2 HOGS AND PORK

In recent years, the pork industry introduced many new consumer-friendly products and experienced increased domestic and export sales. However, the industry faces numerous external and internal issues. Within the industry, for example, issues revolve around consumer perceptions, including animal welfare, food safety, and environmental conditions. Some of these issues are discussed below, prior to providing an overview of the structure of the industry and related industry data.

Hog production has evolved rapidly, and many producers now operate concentrated animal feeding operations (CAFOs). These operations have allowed producers to increase production efficiency and benefit from economies of scale; however, they are also the subject of considerable controversy. Environmental concerns stem from the potential for CAFO buildings and waste

Current issues and changes facing the hog and pork industries relate to

- environmental concerns surrounding CAFOs,
- swine welfare assurance programs,
- pork quality assurance programs,
- the PRRS virus,
- BSE found in North American cattle,
- antidumping duties levied against live hog imports from Canada,
- proposed requirements for COOL, and
- the development of NAIS.

management systems to release pollutants into the air and water. Especially controversial has been the problem of offensive odors that can create sizeable negative welfare effects on rural communities that are exhibited in decreased residential property values (Palmquist, Roka, and Vukina, 1997). The severity of these issues varies by geographical region and has been addressed by both state and federal governments. In 1997, North Carolina, the second largest hog-producing state, placed a moratorium on building or expanding hog farms with more than 250 hogs. The moratorium is set to expire in 2007.

Producers throughout the country are currently working with the Environmental Protection Agency to establish benchmarks for future air emission regulation levels. Pork producers have also worked with their National Pork Producers Council (NPPC) to develop structured programs, such as the Swine Welfare Assurance Program and Pork Quality Assurance, to quantitatively measure compliance with animal care and food safety practices throughout the industry.

The swine industry has been affected by animal health issues over the past few years. In 1986, Porcine Reproductive and Respiratory Syndrome (PRRS) virus began to occur in the United States. PRRS increases the incidence of stillborns, premature births, and aborted litters. The syndrome can also increase dramatically the number of preweaning deaths (Baysinger et al., 1996).

Discovery of BSE in North American cattle also affected the pork industry. Given the changes in international meat trade, it is difficult to determine how much of the recent increase in pork exports is directly attributable to the discovery of BSE. Japan and Mexico, previously important export markets for U.S. beef, increased U.S. pork imports by 10 percent and 70 percent, respectively (Truit, 2004). In addition, some domestic consumers substituted pork for beef as beef prices hit record high levels, in part because of the U.S. ban on imports of live Canadian cattle.

In 2004, NPPC, several State Pork Associations, and over 100 producers filed petitions with the U.S. Department of Commerce (DOC) and the International Trade Commission (ITC) requesting that antidumping and countervailing duties be levied against Canadian hog imports (Haley, 2004). In August 2004, DOC ruled that the Canadian subsidies were not illegal;

however, the DOC reversed its decision in October 2004 and antidumping penalties were assessed. In April 2005, ITC determined U.S. producers were not materially injured by Canadian hog imports, effectively ending the case unless the decision is appealed.

As with the beef industry, the pork industry is currently facing other issues related to government regulation. In particular, COOL and NAIS will have a dramatic effect on the industry. The remainder of this section describes the stages of production for pork, location and trends in hog and pork operations, exports and imports of hogs, and hog prices.

2.2.1 Stages of Pork Production

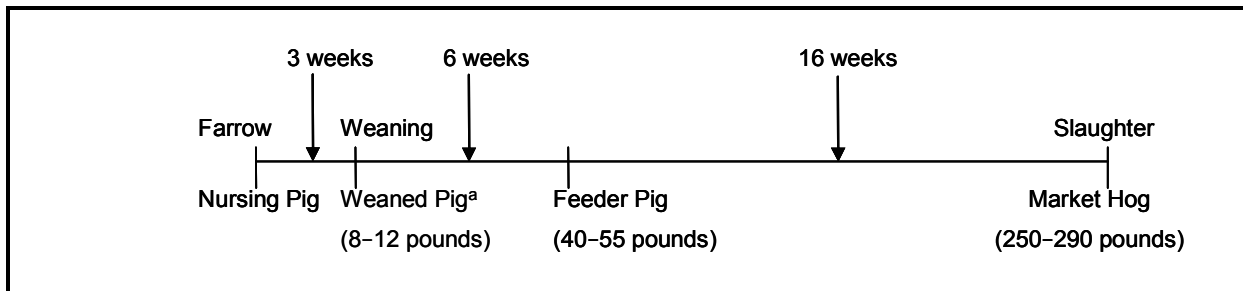
Hogs are now commonly produced by specialized operations that use separate production facilities for each phase of production.

Traditionally, hogs were raised in farrow-to-finish operations on small diversified farms where hogs provided price risk protection for grain production. Starting in the 1950s, many farmers adopted new technologies that allowed them to grow and specialize in feed grain production. Some farmers discontinued hog production because the opportunity cost of time and land increased, and risk protection for feed grains was supplemented by income and price supports (Spinelli, 1991). Hogs are now commonly produced by specialized operations that use separate production facilities for each phase of production.

The production phases are categorized into three segments: farrow-to-wean, wean-to-feeder, and feeder-to-finish. The output from one production segment is generally the input into the next segment; however, the lines that separate each segment are less pronounced in actual production. Figure 2-13 illustrates a typical timeline for hog production.

Figure 2-13. Hog Production Timeline

Capital-intensive production has solidified hog production methods into relatively precise segments.



^aAlso known as nursery pig or isowean.

During the **farrow-to-wean** phase, hog producers house parent stock sows that are bred by natural or artificial insemination for the production of nursing pigs. These pigs are weaned from the sow at 2 to 3 weeks of age, at which time they weigh between 8 and 12 pounds each.

Following the farrow-to-wean stage, hogs enter the **wean-to-feeder** production stage. This transition occurs in several different ways: weaner pigs might remain at the same physical location as the sow, weaner pigs might be shipped to a separate location, or younger aged isoweans might be shipped to a separate (isolated) nursery facility. Whichever method is used, the pigs are fed for approximately 6 weeks until they weigh between 40 and 55 pounds. The hogs are then ready to enter the final feeder phase of production.

In the **feeder-to-finish** segment, feeder pigs are fed for approximately 16 weeks until they reach a market weight of 250 to 290 pounds. Operations that retain weaned hogs up to the feeder stage might continue to feed those animals to market weight (farrow-to-finish operations), or they might choose to sell the hogs rather than feed them (farrow-to-feeder operations). Hogs from nursery operations are transferred into a separate finishing operation. Some growers specialize in the final two production stages and purchase weaner pigs to raise them to slaughter weight (wean-to-finish). However, given the vastly different level of care weaner pigs need relative to finishing hogs, this type of production is not as common.

Some packers only slaughter hogs and sell the carcasses to a separate processor or breaker; however, the majority of packers have their own fabrication facilities.

Regardless of the method used to raise the pigs, the finished market hogs are shipped to a slaughter facility (packer). As with all meat types, hog carcasses are inspected for wholesomeness by USDA/FSIS or by a state government inspection system. However, unlike beef, pork is rarely quality graded by USDA/AMS. Instead, packers rely on other measures of quality, such as lean percentage, back fat, and loin eye depth. After the hogs have been slaughtered, the carcasses are chilled and then sent to the fabrication area of the plant where they are broken down into pork cuts. Some packers only slaughter hogs and sell the carcasses to a separate processor or breaker; however, the majority of packers have their own fabrication facilities. The largest cuts are primals consisting of groups of muscles from the same area of the carcass. These primals are further cut into subprimals and portion cuts. Fresh

meat cuts are typically sold as boxed pork, which refers to similar cuts that are boxed together for shipping. Many of these meat cuts will still need to be further processed or repackaged by the buyer before they are ready for sale to consumers. Packers also package case-ready meats that are ready to be placed in the retail meat case.

Technology has played a large role in hog producers' ability to change production practices over time. Implementation of health safeguards, such as subtherapeutic antibiotics, allowed hogs to be raised in high-population densities (Spinelli, 1991). Biosecurity and other production principles have facilitated the growth in segregated production facilities. Producers design facility layouts to minimize the risk of disease exposure from people, wildlife, machines, and other production facilities. Hogs are moved through facilities on an all-in all-out basis, and facilities are washed and disinfected before new hogs are introduced. Also, quarantine procedures have been established for bringing additional animals into breeding herds (Tubbs, 1993).

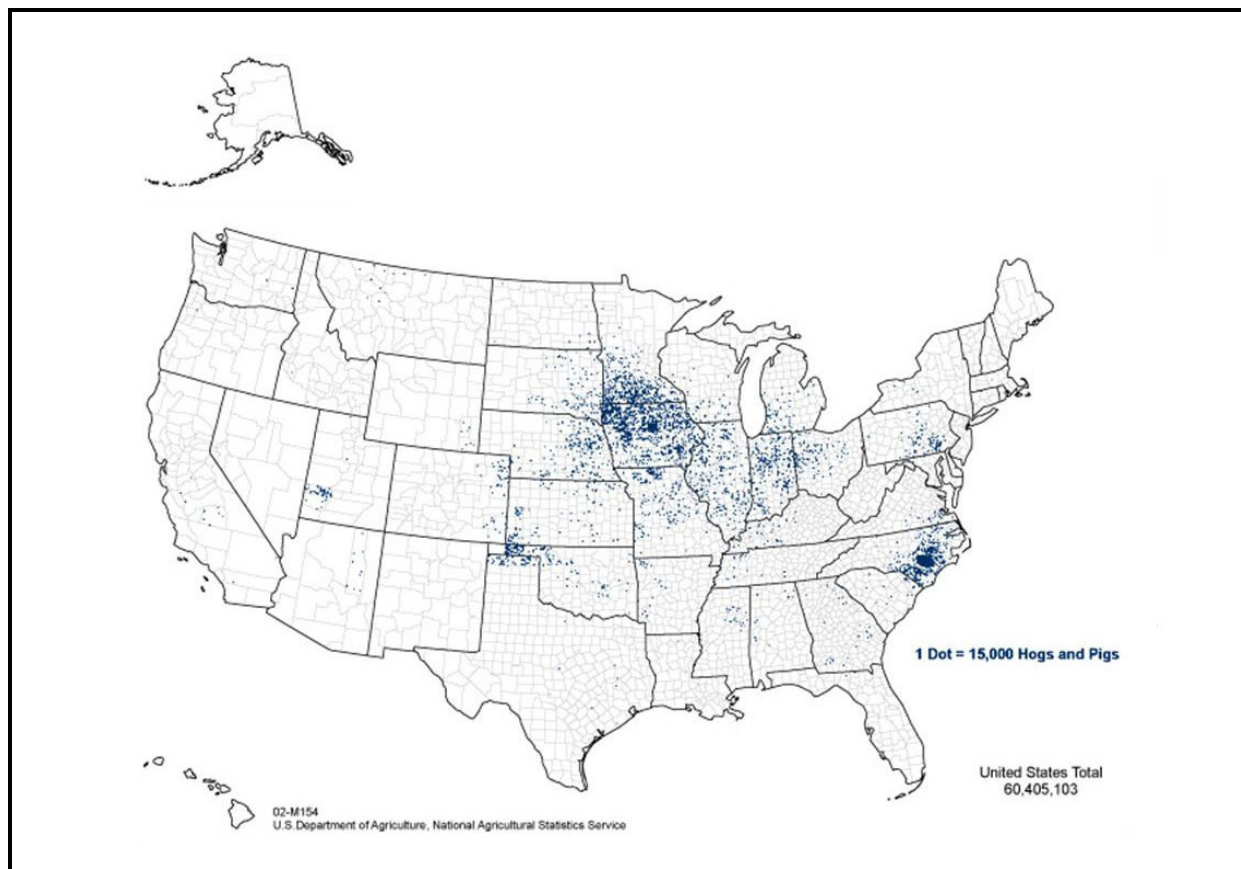
2.2.2 Locations of Pork Operations

Hog production has been shifting over time from the Corn Belt States to other states such as North Carolina, Oklahoma, Utah, and Wyoming.

Hog production in the United States has historically been concentrated in the Corn Belt States. In 1990, Iowa, Illinois, Minnesota, Indiana, and Nebraska had the largest hog inventories in the country (USDA-NASS, 1994). As discussed above, hog production was traditionally part of diversified farming practices, and given that feed costs account for approximately 60 percent of the cost for producing market hogs (Lawrence, Kliebenstein, and Hayenga, 1998), hog producer operations were located close to feed supplies. However, by 1994, North Carolina had the second largest hog inventory in the country (USDA-NASS, 1998), thus indicating a shift in production locations. Between 1990 and 2003, the largest growth percentages in hog inventory were in Utah, Oklahoma, Wyoming, and North Carolina, respectively. Figure 2-14 maps the U.S. inventory of hogs in 2002. Many of the nontraditional hog-producing states now supply the Corn Belt States with feeder pigs. For example, in 2003 Iowa imported as many feeder hogs from Canada and other states as it produced locally (Haley, 2004), suggesting that producers in Iowa are becoming more specialized in feeding operations.

Figure 2-14. U.S. Inventory of Hogs and Pigs, 2002

Most of the hog production is conducted in the Corn Belt and the Southeast.



Source: U.S. Department of Agriculture, National Agricultural Statistics Service. 2004b. "2002 Census of Agriculture." Washington, DC: USDA. <<http://www.nass.usda.gov/research/atlas02/>>.

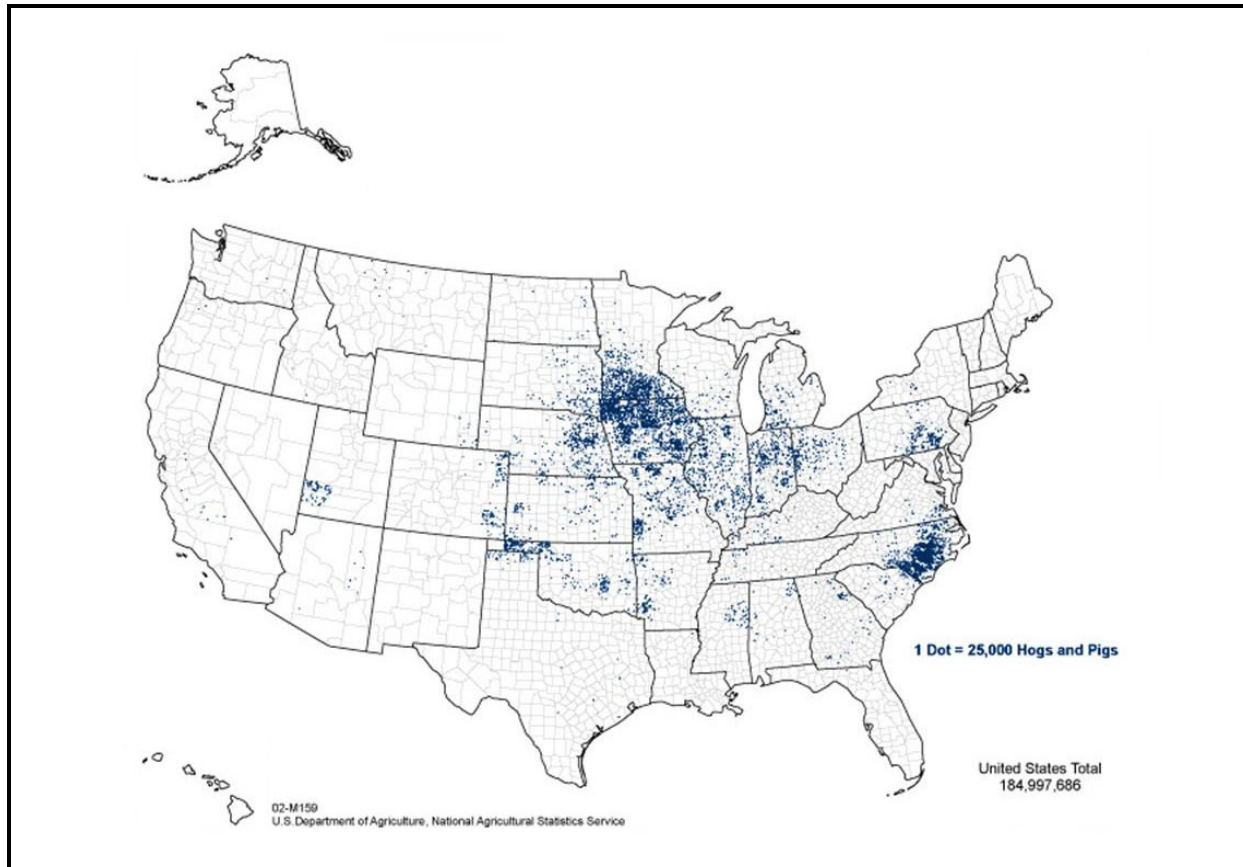
Transporting intermediate-stage hogs to different geographical areas is a relatively new practice. Hog production has always been unique compared with other livestock species, in that breeding and finishing occur in the same area. Figure 2-15 shows that in 2002 the regions of the Southeast and the Corn Belt that dominate production were also the regions where most hogs are sold.

The largest hog packers are located close to hog production facilities.

As the location of hog inventories has changed, so has the location of slaughter facilities (Figure 2-16). In 1990, almost 60 percent of U.S. slaughter capacity was located in Iowa and surrounding states. By 2003, North Carolina had become the second largest state in slaughter capacity. Large increases in hog inventories for nontraditional hog-producing states (e.g., Oklahoma and North Carolina) directly coincide with the

Figure 2-15. Number of Hogs and Pigs Sold, 2002

All phases of hog production are conducted in the same geographical locations.

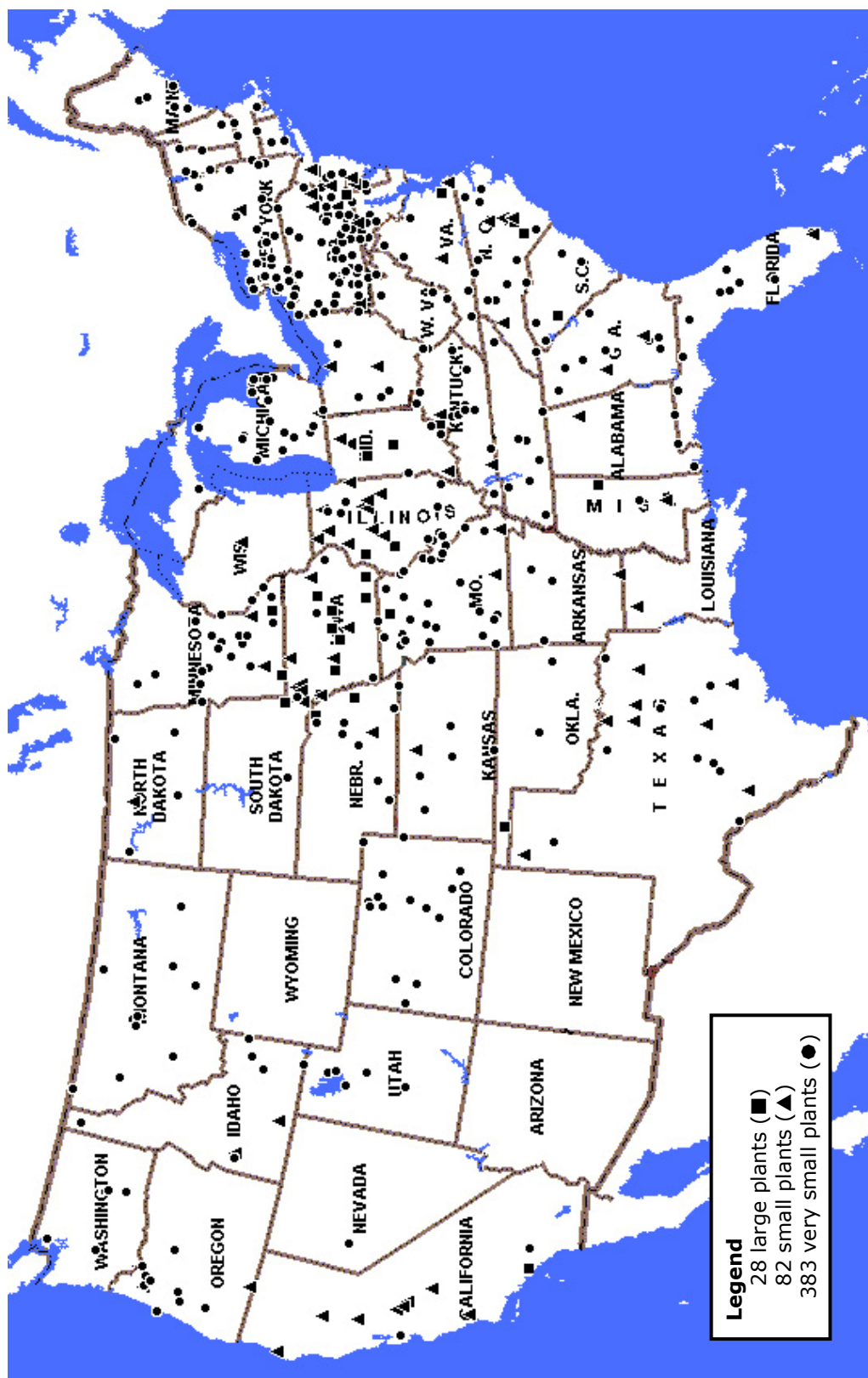


Source: U.S. Department of Agriculture, National Agricultural Statistics Service. 2004b. "2002 Census of Agriculture." Washington, DC: USDA. <<http://www.nass.usda.gov/research/atlas02/>>.

opening of large slaughter facilities in those states. Comparing Figures 2-14 and 2-16 shows that the largest packers continue to be located close to production facilities.

2.2.3 Trends in Pork Operations

The total U.S. inventory of hogs and pigs (Figure 2-17) has remained relatively stable since 1990; however, there has been significant variation within the individual stages of production. The number of breeding hogs decreased 12 percent from 1990 to 2002. During the same period, the number of market hogs increased by more than 12 percent.

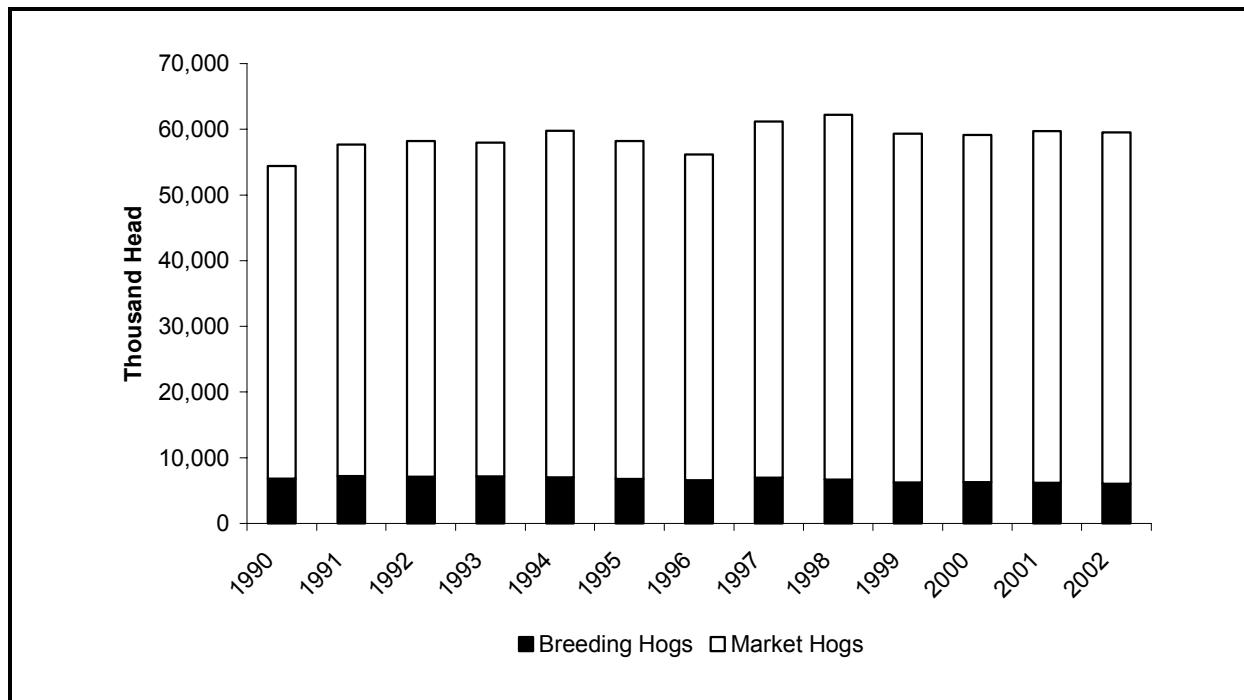
Figure 2-16. Location of Federally Inspected Plants that Slaughter Barrows and Gilts^a

^aPlants that slaughtered at least 50 head of barrows and gilts in FY2004 (October 1, 2003 through September 30, 2004) are included. Of 493 plants, 28 are classified by FSIS as large, with 500 or more employees; 82 are classified as small, with 10 to 499 employees; and 383 are classified as very small, with fewer than 10 employees or less than \$2.5 million in annual sales. Plants in Alaska (2) and Hawaii (5) are not shown.

Source: RTI International. 2005. Enhanced Facilities Database. Prepared for the U.S. Department of Agriculture, Food Safety and Inspection Service. Research Triangle Park, NC: RTI.

Figure 2-17. U.S. Inventory of Hogs and Pigs, December 1, 1990–2002

Hog and pig inventory categories include breeding hogs (all hogs kept for breeding purposes) and market hogs (all hogs from those less than 60 pounds to those greater than 180 pounds that are intended for sale as market hogs).



Source: U.S. Department of Agriculture, Economic Research Service. 2004g. "Red Meat Yearbook." Stock #94006. Washington, DC. <<http://usda.mannlib.cornell.edu/data-sets/livestock/94006/>>.

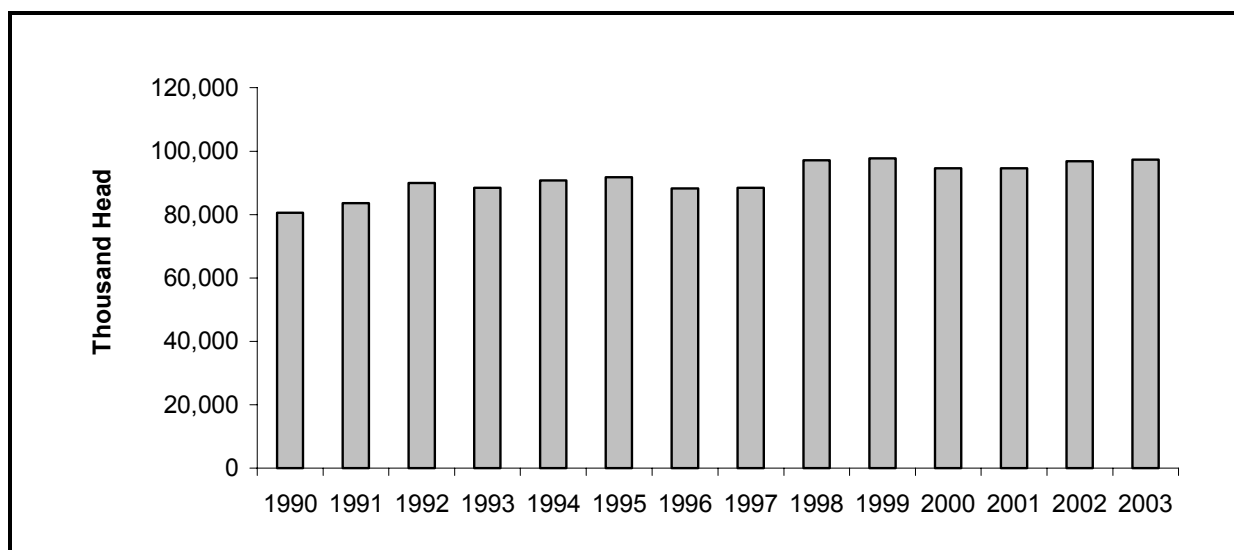
The net effect of the changing domestic herd and Canadian imports is a steadily growing number of market hogs, barrows, and gilts slaughtered by U.S. packers.

To reconcile the difference between the decreasing size of the breeding herd and the increasing number of market hogs, a comparison can be made between the number of pigs born per litter and the number of pigs per breeding animal. The number of pigs per breeding animal per year grew by 57 percent between 1979 and 2001, with 29 percent of that increase attributed to the increase in the average litter size. The remaining 71 percent is attributed to the increase in the number of litters per sow per year (USDA-NASS, 2002b). Collectively, this shows that the efficiency of the U.S. breeding herd is improving in terms of delivering more pigs from a smaller breeding herd. The difference between the decreasing breeding herd and the increasing number of market hogs is also partially offset by imported feeder hogs. Canada is the primary supplier of live hogs to the United States, providing 99.99 percent of the 7 million plus hogs imported in 2003 (Haley, 2004). More than 65 percent of those animals were imported as 10- to 40-pound feeder hogs that were fed to slaughter weight in the United States.

The net effect of the changing domestic herd and Canadian imports is a steadily growing number of market hogs (barrows and gilts) slaughtered by U.S. packers (Figure 2-18). Market hogs constitute over 96 percent of the hogs slaughtered in the country (USDA-GIPSA, 2002a). The average annual growth in slaughter volume was just over 1 percent between 1990 and 2003.

Figure 2-18. U.S. Commercial Barrow and Gilt Slaughter, 1990–2003

Commercial barrow and gilt slaughter includes animals slaughtered at federally inspected and nonfederally inspected plants but does not include animals slaughtered on the farm.



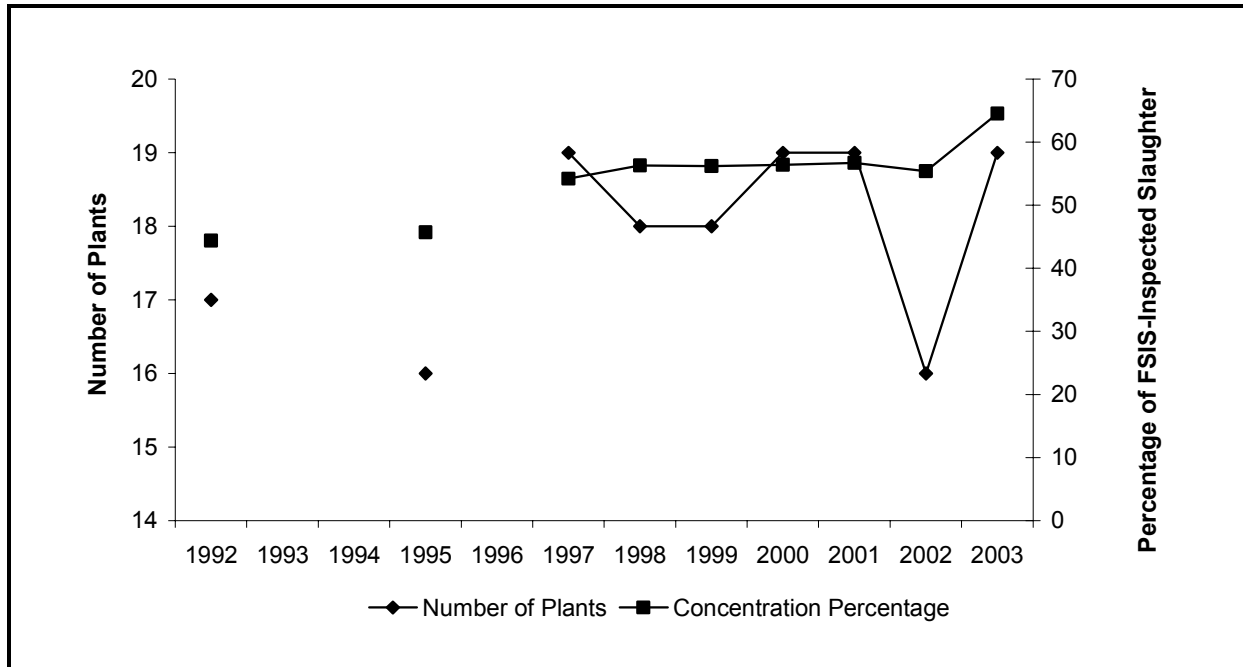
Source: U.S. Department of Agriculture, Economic Research Service. 2004g. "Red Meat Yearbook." Stock #94006. Washington, DC. <<http://usda.mannlib.cornell.edu/data-sets/livestock/94006/>>.

Packers were able to produce more pork per pig slaughtered, as the average market hog's liveweight increased by 17 pounds and carcass weight increased 20 pounds during the same period. Availability of hogs and carcass weight are two of the factors that contribute to individual packer efficiency. Packers have increasingly built larger facilities that operate closer to capacity to decrease per-unit costs of production (Ward, 2003). This shift in operations was facilitated by the decrease in seasonal fluctuations of hog production. Previously, packers maintained excess capacity for most of the year to accommodate large slaughter levels during the last quarter of the year (Haley, 2004). Subsequently, fewer packing facilities are currently operating. In fiscal year 2002, 558 federally inspected plants slaughtered at least 50 market hogs. However, as indicated in the CR4, the four largest packers slaughtered

over 50 percent of the hogs under federal inspection since 1997 (Figure 2-19). The total number of plants operated by these companies has varied since 1992.

Figure 2-19. U.S. Hog Packer Four-Firm Concentration Ratio (CR4), Selected Years 1992–2003

The CR4s show the percentage of all hogs slaughtered at plants owned by the four largest firms during the respective year. The total number of plants operated by those firms is also included. Percentages are based on total federally inspected slaughter numbers.



Source: U.S. Department of Agriculture, Grain Inspection, Packers and Stockyards Administration. 2004b. "Packers and Stockyards Statistical Report." SR-04-1. Washington, DC: USDA.

2.2.4 Imports and Exports of Hogs and Pork

The United States is a net importer of live hogs (Figure 2-20). As discussed earlier, virtually all the live hogs imported into the United States are from Canada. The total number of hogs imported increased dramatically since 1990, while the type of hogs imported changed concurrently. In 1990, 77 percent of the Canadian hogs were slaughter hogs and 23 percent were feeder pigs. By 2003, the numbers switched: 33 percent of imported hogs were slaughter hogs and 67 percent were feeder pigs. Approximately 95 percent of the feeder pigs are shipped to Midwest and Corn Belt States. Slaughter hog shipments are more dispersed, but the majority of shipments are destined for the Western States (Haley, 2004). Mexico consumes over 80 percent of U.S. live exports. From mid-1980 to the early 2000s,

Figure 2-20. Total U.S. Hog Imports and Exports, 1990–2003

The United States is a net importer of live hogs. Live animal trade is typically restricted to North America.



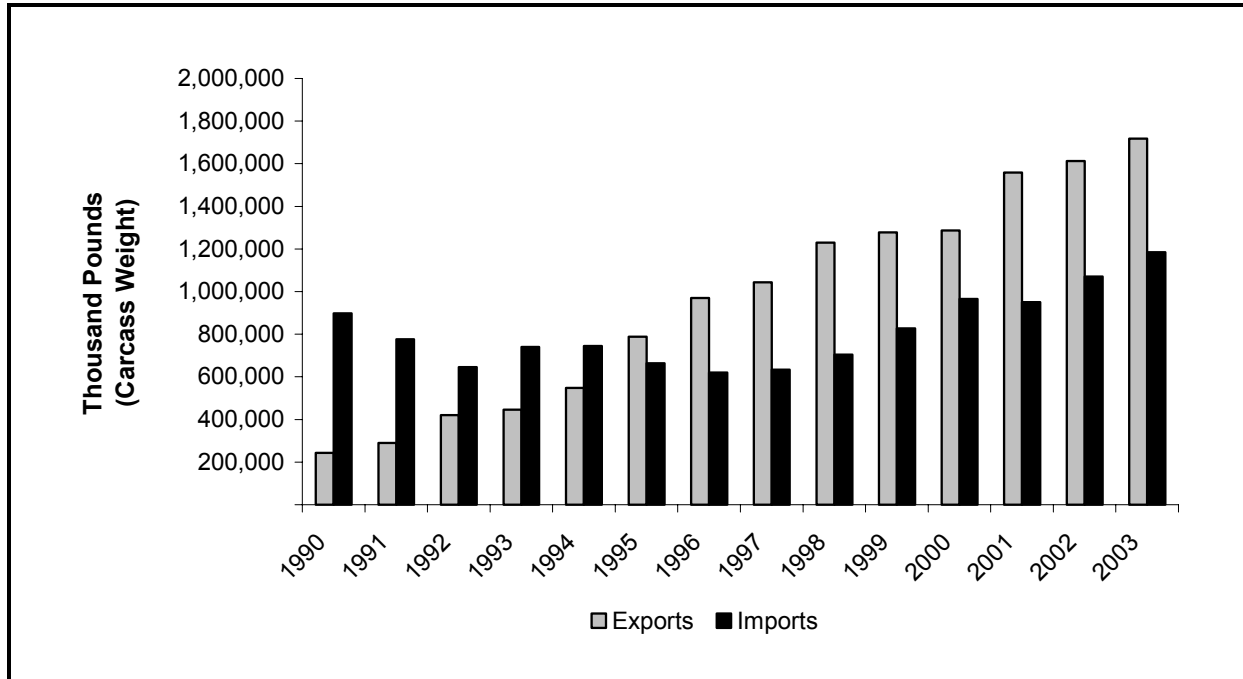
Source: U.S. Department of Agriculture, Economic Research Service. 2004g. "Red Meat Yearbook." Stock #94006. Washington, DC. <<http://usda.mannlib.cornell.edu/data-sets/livestock/94006/>>.

nearly two thirds of live exports were slaughter hogs, and approximately one third were breeding animals (USDA-ERS, 2004e).

The United States has recently become a net exporter of pork products (Figure 2-21). In addition, the United States is the third largest pork importer in the world. In 2003, pork imports were approximately 6 percent of U.S. pork consumption, and exports were approximately 9 percent of U.S. pork production (USDA-ERS, 2004e). Over three quarters of the U.S. pork exports are sent to Japan, Mexico, and Canada. Japan, the world's largest pork importer, consumes 46 percent of U.S. pork exports (USDA-ERS, 2004e). Canada and Denmark continue to be the primary suppliers of imported pork to the United States. Expansion in the Canadian hog industry and lower costs relative to Denmark have allowed Canada to become the dominant foreign supplier since 1985 (USDA-ERS, 2004e).

Figure 2-21. Total U.S. Pork Imports and Exports, 1990–2003

The United States has become a net exporter of pork products. Canada, Denmark, and the Netherlands are the primary sources of imported pork. Japan, Mexico, and Canada are the primary destinations for exported U.S. pork.



Source: U.S. Department of Agriculture, Economic Research Service. 2004g. "Red Meat Yearbook." Stock #94006. Washington, DC. <<http://usda.mannlib.cornell.edu/data-sets/livestock/94006/>>.

2.2.5 Hog Prices

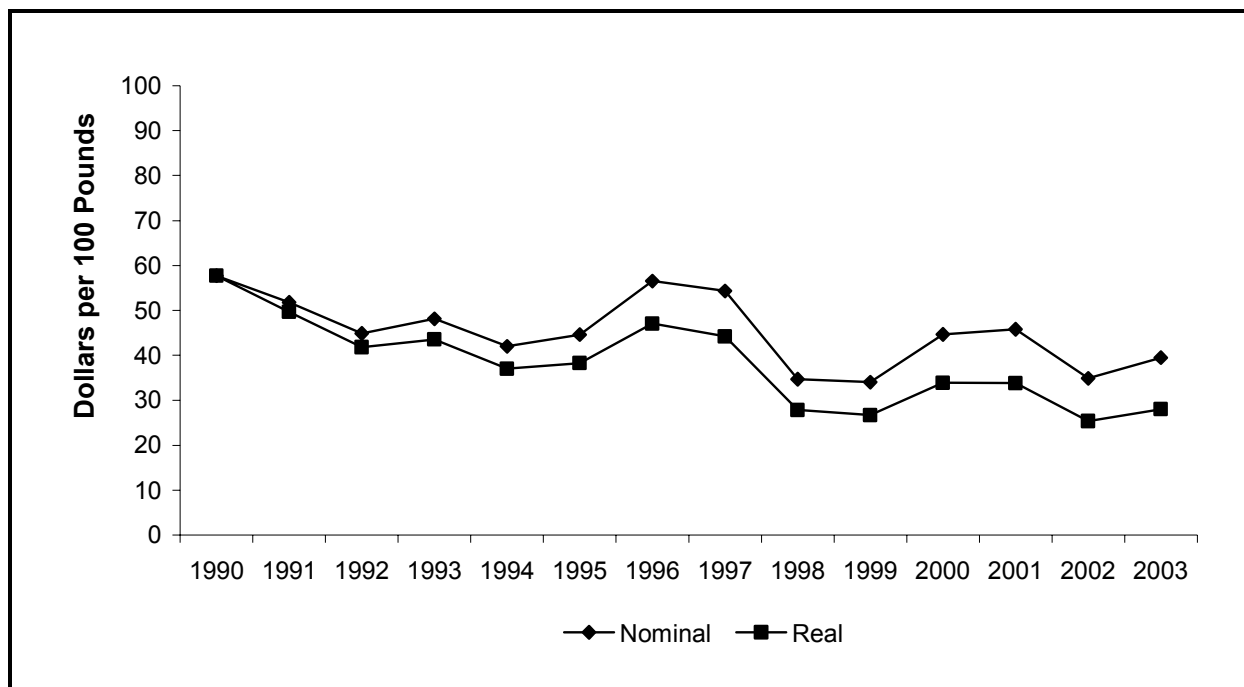
Prices for market hogs have traditionally been subject to seasonal and yearly fluctuation. Seasonal fluctuation is a direct result of the variation in the number of available slaughter hogs throughout the year. Producers' use of indoor production facilities and other changes in production methods have decreased the seasonality of production (Mark and Hunnicutt, 2004) and subsequently decreased the magnitude of seasonal price swings. Despite the changes in production methods, prices continue to fluctuate across years (Figure 2-22).

The length and severity of a cycle depend on producers' expectations about market conditions, but the average hog cycle lasts about 4 years peak to peak.

The multiyear price fluctuation is commonly referred to as the hog cycle. The foundation for the hog price cycle lies in the biological lags of hog production. When prices begin to rise, producers are enticed to increase production, but increased production is not instantaneous. It takes approximately 12 months for a newborn gilt to be raised to breeding age and farrow a litter (USDA-ERS, 2004d). Prices continue to rise as fewer hogs are brought to market, while producers retain gilts during the buildup phase of the cycle. As the additional hogs begin to enter the market, prices begin to stabilize and

Figure 2-22. 51 Percent to 52 Percent Lean Hog Price, Live Equivalent, 1990–2003

Live equivalent prices are calculated to estimate the value of a live hog based on standard carcass characteristics. Real prices are equal to nominal prices adjusted (deflated) to account for inflation.



Note: Prices were deflated by the consumer price index for all urban consumers (1990 = 100) (U.S. Bureau of Labor Statistics. "Consumer Price Index-All Urban Consumers, U.S. All Items." <http://data.bls.gov/cgi-bin/surveymost?cu>. Accessed April 18, 2005.)

eventually decrease when the market becomes saturated. The price decline is called the liquidation phase because producers begin to cull sows that are no longer profitable to keep in the herd. Ultimately, herds will become too small to keep the market at equilibrium and the cycle will begin again.

Historically, the cycle appears to have occurred with a somewhat regular 3- to 5-year frequency, but the role of the cycle seems to have diminished since the late 1990s and early 2000s (Holt and Craig, 2006).

Significant changes in the way hogs are sold have altered the base prices used in the hog industry. The increasing trend to sell hogs based on the carcass characteristics or merit has reduced use of the live hog pricing system. Many of the prices reported by USDA-AMS are now carcass prices. The Chicago Mercantile Exchange (CME) discontinued their live hog futures contract and transitioned to a lean hog contract, based on 51 to 52 percent lean carcasses in January 1997 (Wood, 1997). Some producers still use live hog auctions to market hogs, but the volume traded has declined dramatically.

2.3 LAMBS AND LAMB MEAT

Wool, lamb, and mutton are all products of the sheep industry, but historically wool has been the primary product of interest; lamb and mutton have been considered by-products.

The U.S. lamb industry is a relatively small and fragmented industry. Wool, lamb, and mutton are all products of the sheep industry, but historically wool has been the primary product of interest; lamb and mutton have been considered by-products (USDA-ERS, 2004h). However, decreasing demand for wool has motivated change in the industry. In 1993, wool constituted about 1 percent of mill use and 1.7 percent of domestic consumption of all fibers. Synthetic fibers, cotton, and imported wool are all competitors to domestic wool. The majority of the carpet wool and apparel wool used in the United States is imported (ASI, 2005). As the revenues from wool sales declined, the importance of meat production increased. Currently, approximately 80 percent of the U.S. sheep herd is involved in lamb production (ALB, 2005).

Lamb and mutton are two distinct meat products. Mutton is meat from mature sheep (usually culled breeding animals) that is characterized by decreased tenderness and stronger flavor compared with lamb. Mutton is not highly desired in the United States and subsequently is heavily discounted or exported to other countries. Lamb is meat from immature sheep, usually less than 14 months old, that has a lighter color and mild flavor. Leg and loin cuts are the cuts preferred by U.S. consumers; less desirable cuts are processed, exported, or used in pet food (USDA-ERS, 2004h). Despite the increased attention to meat production, the decreased competitiveness of domestic wool and declining domestic lamb and mutton consumption have contributed to the long-term decline in sheep inventories.

Several government programs provide assistance to the dwindling number of sheep producers. The 1954 Wool Act developed a subsidy payment system to ensure an adequate supply of wool was available for military use. The Wool Act remained in effect with some modifications until 1995. A 3-year tariff-rate quota on lamb meat was imposed in 1999. The tariff-rate quota was removed in 2001 after the World Trade Organization ruled in favor of complaints filed by New Zealand and Australia. In 2000, the Lamb Meat Adjustment Assistance Program (LMAAP) was established to stabilize the lamb market and help producers compete with foreign suppliers (USDA-FSA, 2002). This 4-year project paid producers to make facility and

Current issues and changes facing the lamb and lamb meat industries relate to

- establishment of the Lamb Meat Adjustment Assistance Program (LMAAP),
- discontinuation and then reinstatement of the Wool Support Program,
- the existence of scrapie disease in live sheep,
- BSE found in North American cattle,
- proposed requirements for COOL, and
- the development of NAIS.

flock improvements, including a ewe-lamb retention program. The Farm Security and Rural Investment Act of 2002 (i.e., the 2002 Farm Bill) reintroduced support for wool production through marketing assistance loans and loan deficiency payments.

Animal health is also a concern in the sheep industry. The existence of scrapie in the U.S. flock has limited trade of live sheep, embryos, semen, and rendered products (Kahler, 2002). Scrapie is one of several diseases classified as transmissible spongiform encephalopathy (TSE) and was first discovered in the United States in 1947. The general class of TSE diseases has been subject to increased attention and concern with the discovery of BSE in cattle (USDA-APHIS, 2005b). The recent changes to international trade restrictions in North America because of BSE have directly affected the sheep industry. The trade restrictions were designed to control the movement of ruminant animals—cattle, sheep, and goats—from affected countries. As with the other meat species, COOL and NAIS are both pending issues that will have a substantial effect on the sheep industry.

The remainder of this section describes stages of production, location and trends in operations, exports and imports of lamb, and lamb prices.

2.3.1 Stages of Lamb Production

The specific stages of production for slaughter lambs include production, backgrounding, feeding, packing, and processing or breaking.⁵ In some areas, all of these stages are distinct production stages. However, production, backgrounding, and feeding are often combined at the livestock production stage, and packing and breaking are also often combined at the meat production stage.

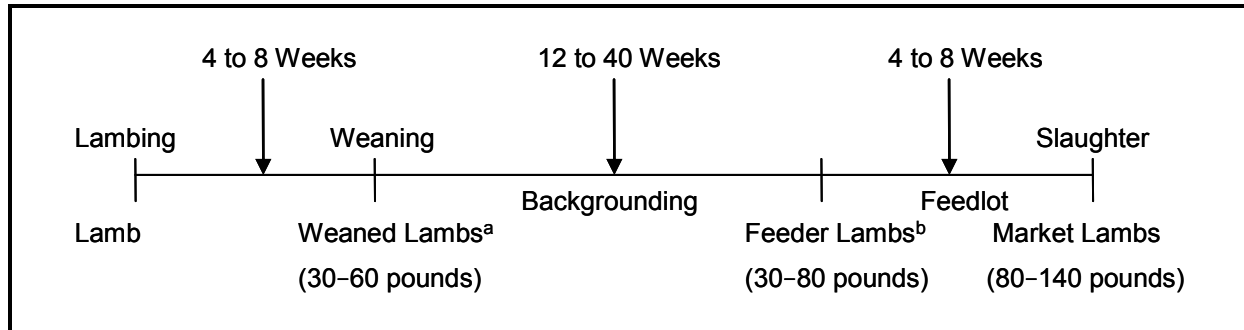
This biological cycle results in the majority of lambing occurring in the spring.

Most sheep can only be bred during specific times of the year. The breeding season tends to be induced by the shorter days of fall (Kott, 2004). This biological cycle results in the majority of lambing occurring in the spring. Newborn lambs will remain with the ewe for 4 to 8 weeks before they are weaned (Figure 2-23). During the nursing period, lambs will gradually

⁵Breaking refers to cutting carcasses into primal, subprimal, and other meat cuts. Although the term “breaking” has been used in the past for all meat species, it is now usually only used in the lamb industry.

Figure 2-23. Lamb Production Timeline

Lamb production time varies depending on the type of meat desired.



^aLambs sold for slaughter after weaning are referred to as milkfat lambs.

^bSome feeder lambs are sold for slaughter after being backgrounded and are referred to as market lambs.

increase their intake of native vegetation. After weaning, lambs can be sent directly to a feedlot or they may be backgrounded. Lambs that go straight to a feedlot are targeted to specific markets that desire young lambs. Backgrounding refers to keeping the lambs on forage while they continue to increase frame size and body mass. At this stage, these lambs are referred to as feeder lambs. Feeder lambs are then placed in feedlots where they are fed a grain-based diet to bring them to slaughter weight and increase intramuscular marbling. Some lambs never enter a feedlot and are strictly grass fed; however, grain-fed lamb dominates U.S. production. The weight of finished market lambs varies, but the average liveweight is 135 pounds.

The production stages have remained relatively unchanged over time, but an increase in vertical integration within the industry has prompted several stages to be performed by a single entity or producer-owned cooperative.

Finished lambs are sent to a packer where they are slaughtered and the pelts and offal are separated from the fresh meat. Lamb carcasses are inspected by USDA/FSIS or a state government inspection service. They are also usually quality graded by USDA/AMS.⁶ Packers either sell the carcass whole to breakers or sell fabricated cuts. Breakers exist in the lamb industry to facilitate the distribution of lamb to consumers. Breakers developed their place in the industry because of the geographical distance separating packers from consumers and the low volume of lamb handled by the large number of retail outlets in consumption areas. Increasingly, packers perform much of the initial breaking and boxing of cuts.

⁶The quality grades differ between lamb and beef, with lamb using Prime, Choice, Good, and Utility grades and beef using Prime, Choice, and Select grades.

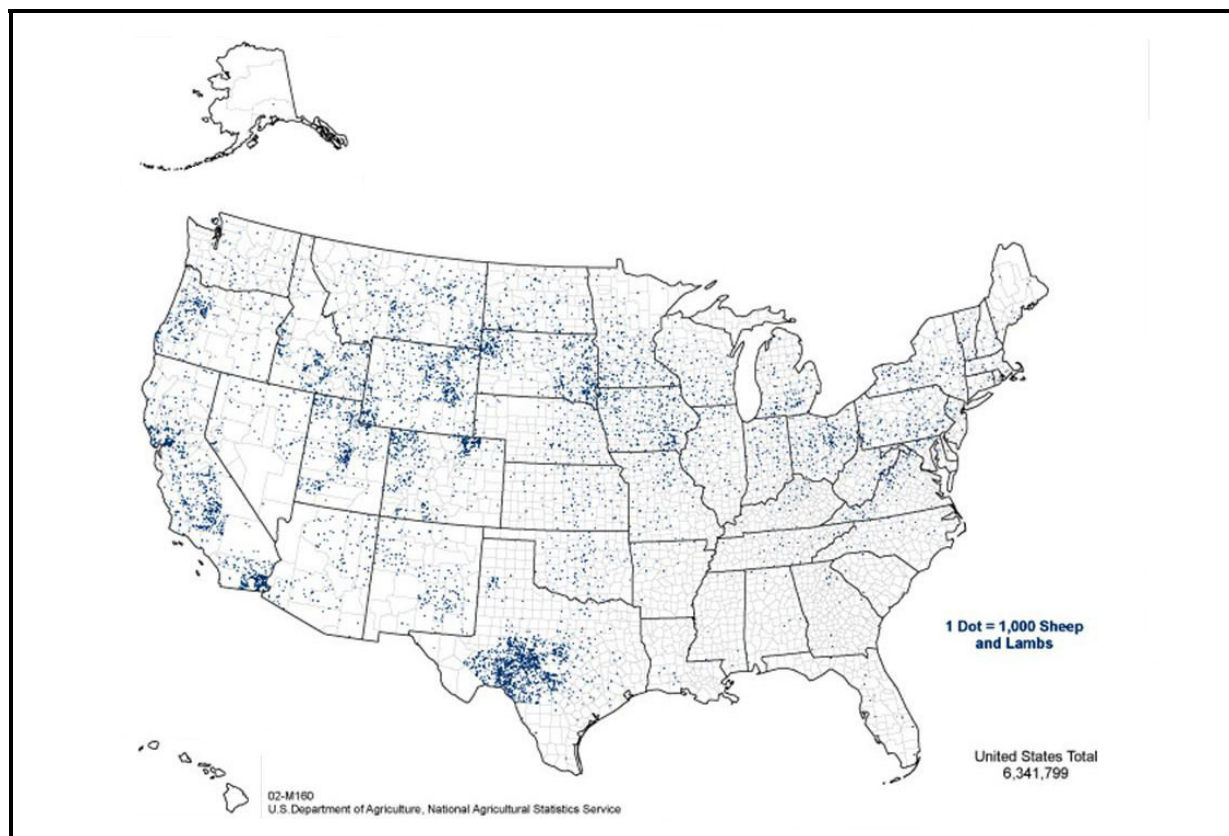
The production stages have remained relatively unchanged over time, but an increase in vertical integration within the industry has prompted several stages to be performed by a single entity or producer-owned cooperative. Some producers not only sell feeder lambs to feedlots but also sell finished lambs to packers, carcasses to breakers, and meat products to retailers and food service providers.

2.3.2 Locations of Sheep and Lamb Operations

Currently, lamb production takes place in all 50 states (Figure 2-24); however, flock sizes vary significantly by geographic location. Small flocks are located throughout the country, and many are part of diversified farms or lifestyle farms. Large flocks are typically located in the western half of the country where large tracts of land are available for grazing. In 2002, 88 percent of sheep farms had fewer than 100 head, but these small farms held only 22 percent of the total sheep inventory.

Figure 2-24. U.S. Inventory of Sheep and Lambs, 2002

Sheep are raised throughout the country.

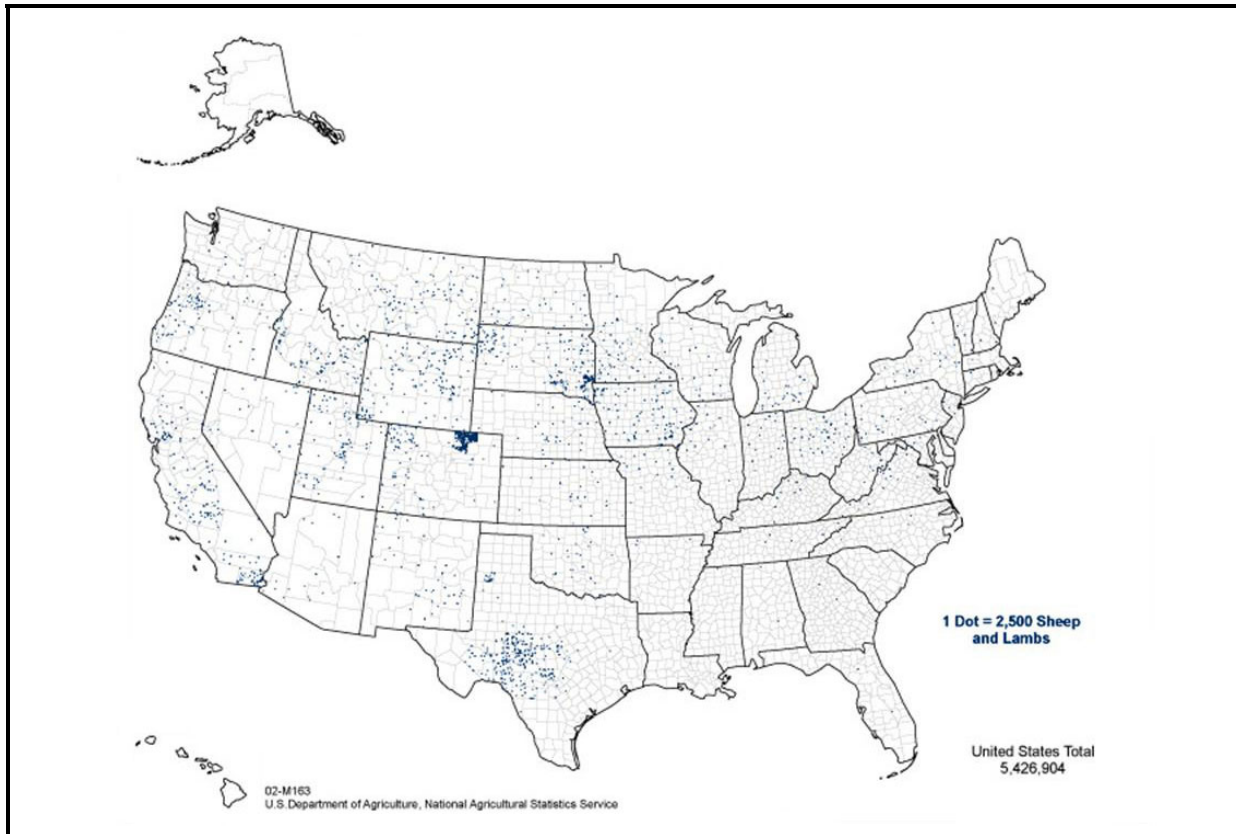


Source: U.S. Department of Agriculture, National Agricultural Statistics Service. 2004b. "2002 Census of Agriculture." Washington, DC: USDA. <<http://www.nass.usda.gov/research/atlas02/>>.

The number of producers and sheep inventories has declined steadily in the United States since 1884, when there were 51 million sheep in the country (USDA-ERS, 2004h). In 2002, there were 6.68 million sheep (USDA-NASS, 2002a) raised on slightly more than 64,000 operations (USDA-NASS, 2003). Figure 2-25 shows that the largest concentration of lamb sales is in the Plains States where several large feedlots are located.

Figure 2-25. Number of Sheep and Lambs Sold, 2002

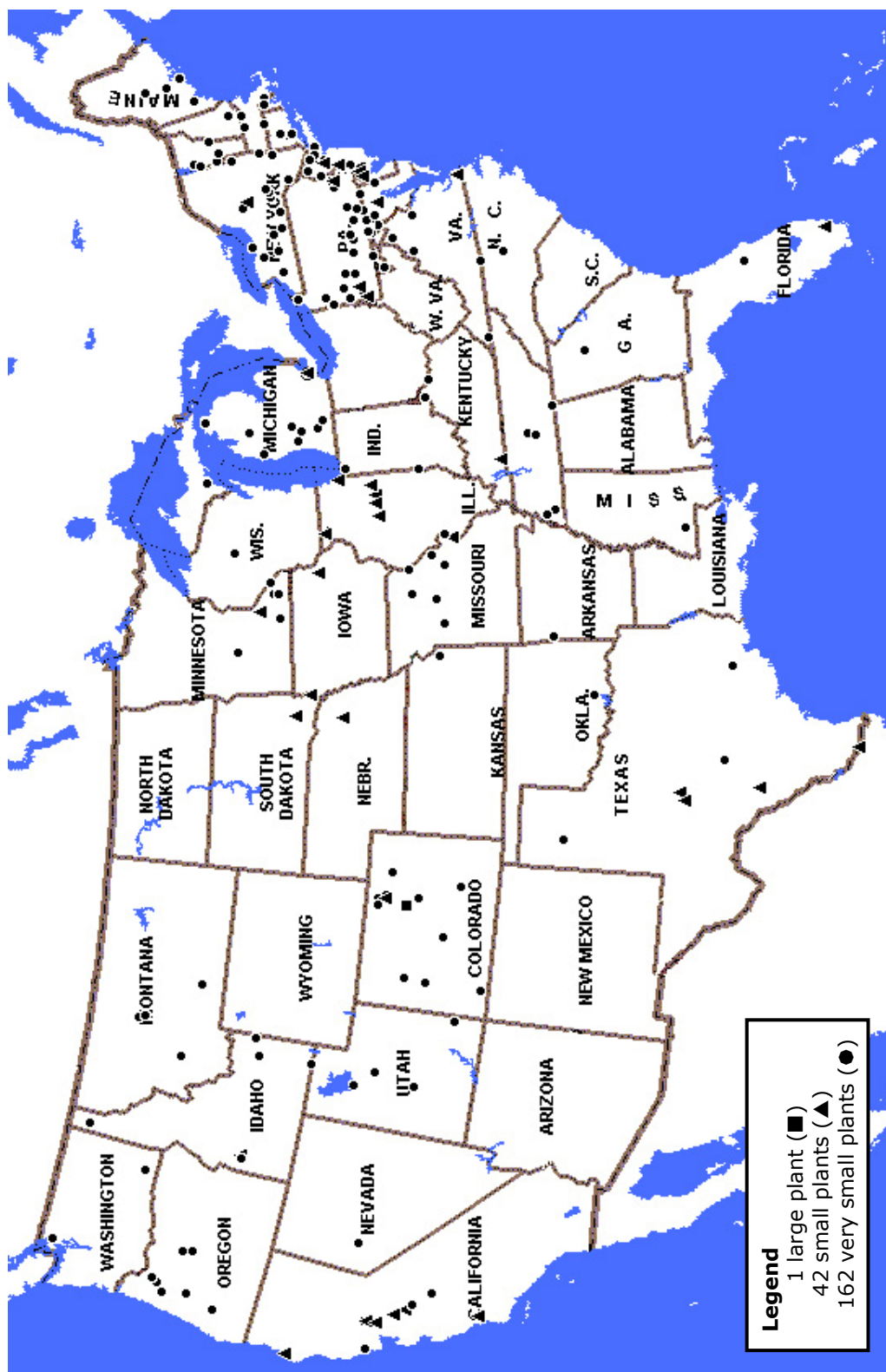
Few regions specialize in large-scale sheep or lamb production but sales are concentrated in California, Texas, and Colorado.



Source: U.S. Department of Agriculture, National Agricultural Statistics Service. 2004b. "2002 Census of Agriculture." Washington, DC: USDA. <<http://www.nass.usda.gov/research/atlas02/>>.

As with lamb producers, lamb packers are located throughout the country (Figure 2-26). However, most facilities are located strategically near lamb feeders, consumers, or both. The only large lamb packer (defined as a plant with 500 or more employees) is very close to large feedlots. Several small (defined as plants with 10 to 499 employees) and very small (defined as plants with fewer than 10 employees) plants are located in the Northeast where consumption of lamb tends to be higher. Several plants are also located on the West coast.

Figure 2-26. Location of Federally Inspected Lamb Slaughter Plants^a



^aPlants that slaughtered at least 50 head of lambs in FY2004 (October 1, 2003 through September 30, 2004) are included. Of 205 plants, 1 is classified by FSIS as large, with 500 or more employees; 42 are classified as small, with 10 to 499 employees; and 162 are classified as very small, with fewer than 10 employees or less than \$2.5 million in annual sales. One plant in Hawaii is not shown.

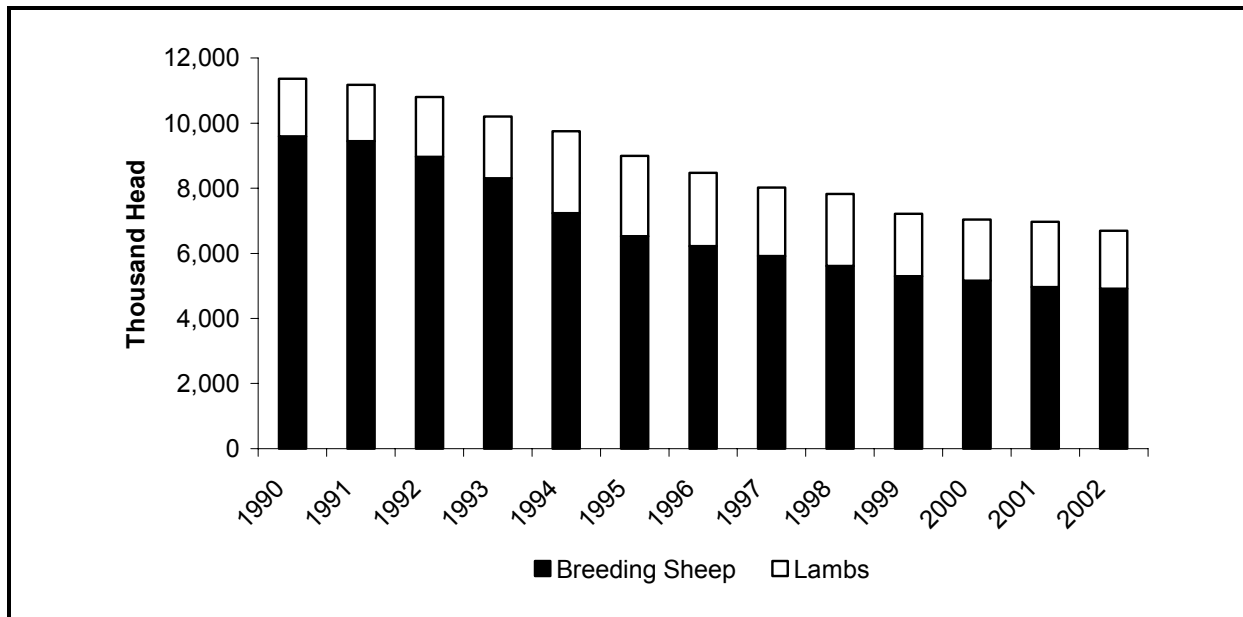
Source: RTI International. 2005. Enhanced Facilities Database. Prepared for the U.S. Department of Agriculture, Food Safety and Inspection Service. Research Triangle Park, NC: RTI.

2.3.3 Trends in Sheep and Lamb Operations

Sheep inventories have continued to decrease in recent years. Figure 2-27 shows total sheep inventories and the underlying breeding herd. Between 1990 and 2002, the total inventory of sheep declined 45 percent, breeding sheep declined 51 percent, and lamb inventories declined 7 percent. Lamb inventories are subject to several environmental conditions, including drought and predators. However, the smaller decrease in progeny inventories may indicate that breeding herd efficiency is increasing. Selective crossbreeding and intensive breeding programs have allowed producers to alter estrus cycles and attempt to increase the frequency of multiple births.

Figure 2-27. U.S. Inventory of Sheep and Lambs, December 1, 1990–2002

Sheep and lamb inventory categories include breeding sheep (ewes, rams, and new crop lambs) and lambs.



Sources: U.S. Department of Agriculture, National Agricultural Statistics Service. 2004a. "Agricultural Statistics." Washington, DC: USDA. <<http://www.usda.gov/nass/pubs/agstats.htm>>.

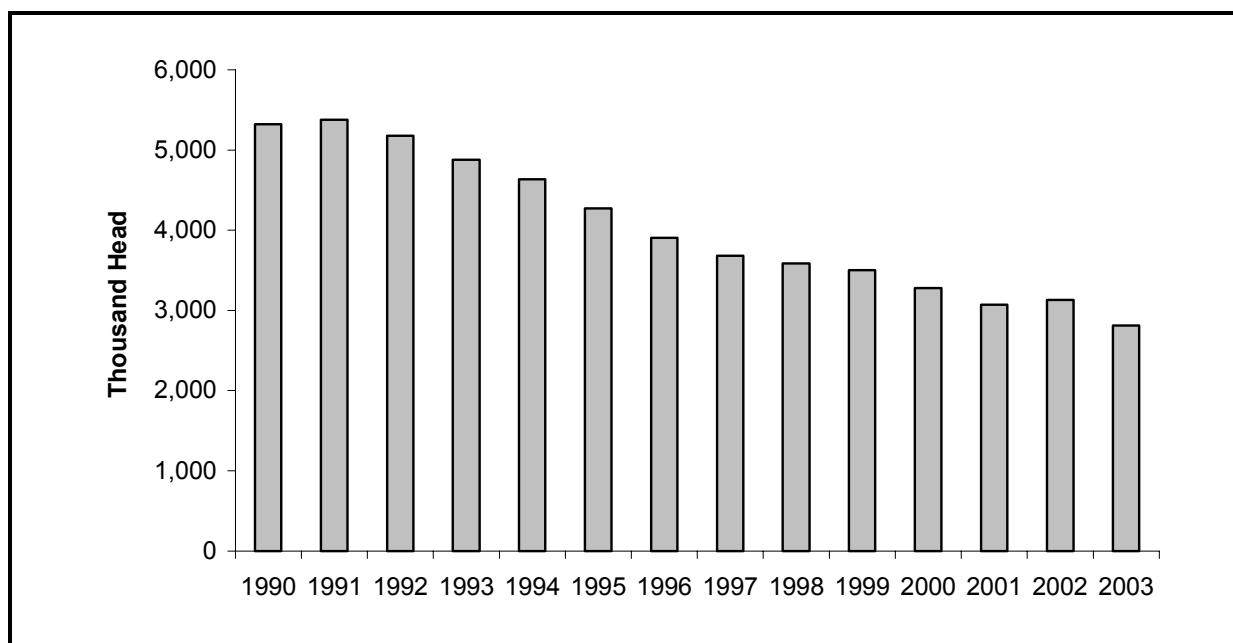
U.S. Department of Agriculture, National Agricultural Statistics Service. 1995–1999a. "Agricultural Statistics." Washington, DC: USDA. <<http://www.usda.gov/nass/pubs/agstats.htm>>.

The number of lambs slaughtered in the United States has declined dramatically over the past decade.

Federally inspected lamb slaughter volumes have decreased more rapidly than the number of marketed lambs. The number of lambs slaughtered at federally inspected facilities decreased by 41 percent from 1990 to 2002 (Figure 2-28). During the same period, the difference between the number of lambs marketed and the number slaughtered at federally inspected

Figure 2-28. U.S. Commercial Lamb and Yearling Slaughter, 1990–2003

Commercial lamb and yearling slaughter includes animals slaughtered at federally inspected and nonfederally inspected plants but does not include animals slaughtered on the farm.



Source: U.S. Department of Agriculture, Economic Research Service. 2004g. "Red Meat Yearbook." Stock #94006. Washington, DC. <<http://usda.mannlib.cornell.edu/data-sets/livestock/94006/>>.

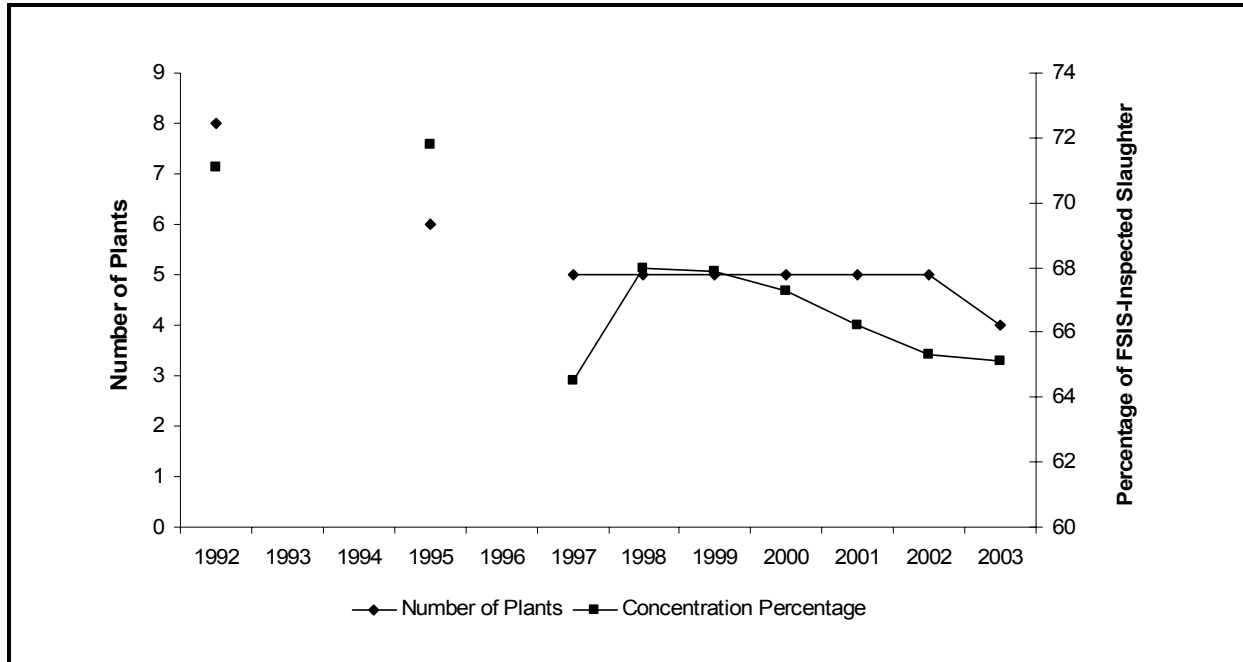
facilities increased. In 1990, federally inspected slaughter accounted for 78 percent of the lambs marketed; by 2002, it had decreased to 65 percent.

Packers have increased the amount of meat produced per animal slaughtered. Between 1990 and 2003, the average liveweight for federally inspected lamb and sheep at slaughter increased from 126 pounds to 135 pounds. During the same period, average carcass weights for lambs increased from 64 to 68 pounds. About 70 percent of the carcass weight is saleable cuts, with fat and bones making up 30 percent (Boland et al., 2005).

Unlike lamb production, the lamb-packing phase is highly concentrated. From 1992 to 2003, the four largest slaughtering companies processed, on average, 67 percent of all U.S. lambs under federal inspection (Figure 2-29). The total number of plants operated by these companies decreased by half since 1992. During fiscal year 2002, 220 federally inspected plants slaughtered 50 or more lambs.

Figure 2-29. U.S. Sheep and Lamb Packer Four-Firm Concentration Ratio (CR4), Selected Years 1992–2003

The CR4s show the percentage of all sheep and lambs slaughtered at plants owned by the four largest firms during the respective year. The total number of plants operated by those firms is also included. Percentages are based on total federally inspected slaughter numbers.



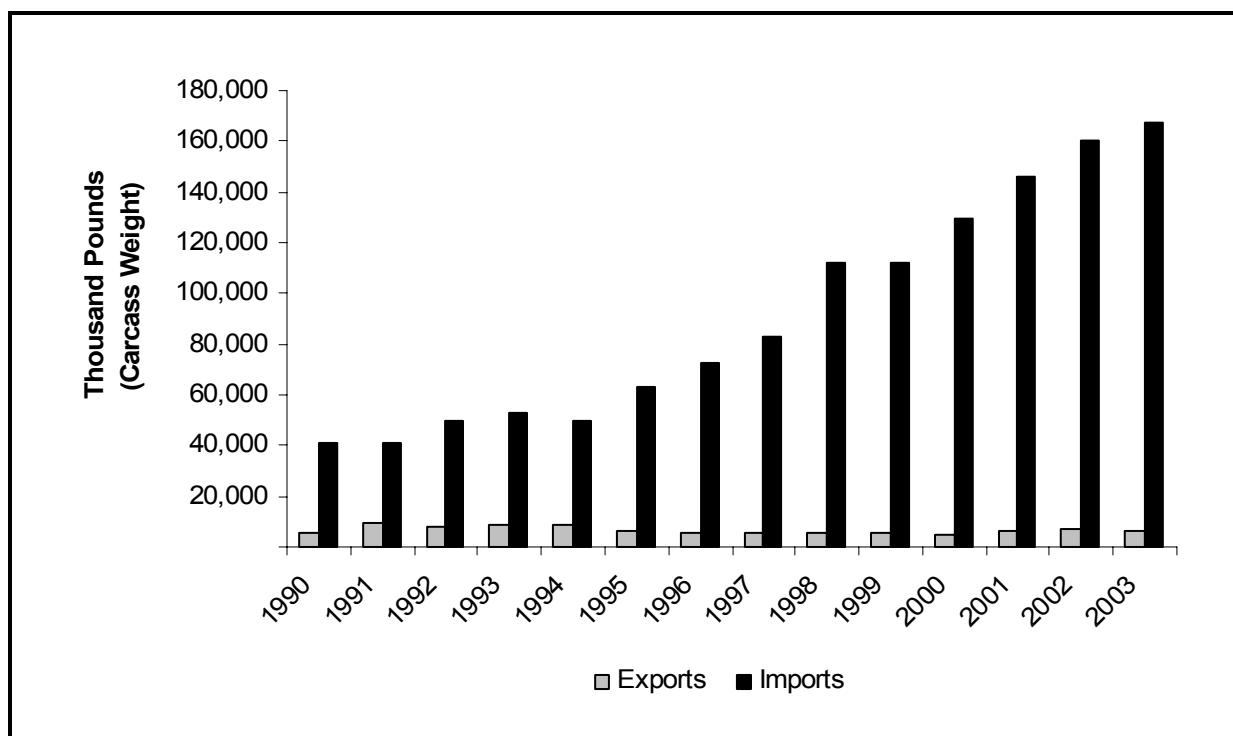
Source: U.S. Department of Agriculture, Grain Inspection, Packers and Stockyards Administration. 2004b. "Packers and Stockyards Statistical Report." SR-04-1. Washington, DC: USDA.

2.3.4 Imports and Exports of Lamb Meat

The large decreases in U.S. production have been partially offset by increased imports of lamb meat (Figure 2-30). In 2003, lamb imports were approximately 46 percent of U.S. lamb consumption, and lamb exports were approximately 3 percent of U.S. lamb production (USDA-ERS, 2004g). Australia and New Zealand supply the majority of imported lamb to the United States. These countries combined account for 40 percent of U.S. consumption (Jones, 2004). Traditionally, lamb exports have not been a large outlet for U.S. lamb production. Exports typically consist of lower-valued cuts that are not desired by domestic consumers or mutton. In 2002, more than 75 percent of U.S. lamb and mutton exports went to Mexico. Japan is the other main importer of U.S. lamb and purchased 7.2 percent of U.S. exports in 2002 (Jones, 2004).

Figure 2-30. Total U.S. Lamb and Mutton Imports and Exports, 1990–2003

The United States is a net importer of lamb and mutton. Australia and New Zealand are the primary sources of imported lamb and mutton.



Source: U.S. Department of Agriculture, Economic Research Service. 2004g. "Red Meat Yearbook." Stock #94006. Washington, DC. <<http://usda.mannlib.cornell.edu/data-sets/livestock/94006/>>.

Very few live sheep are imported or exported by the United States. Most of the existing trade occurs within North America, and the United States has generally been a net exporter of live animals. Live exports are usually culled breeding stock shipped to Mexico.

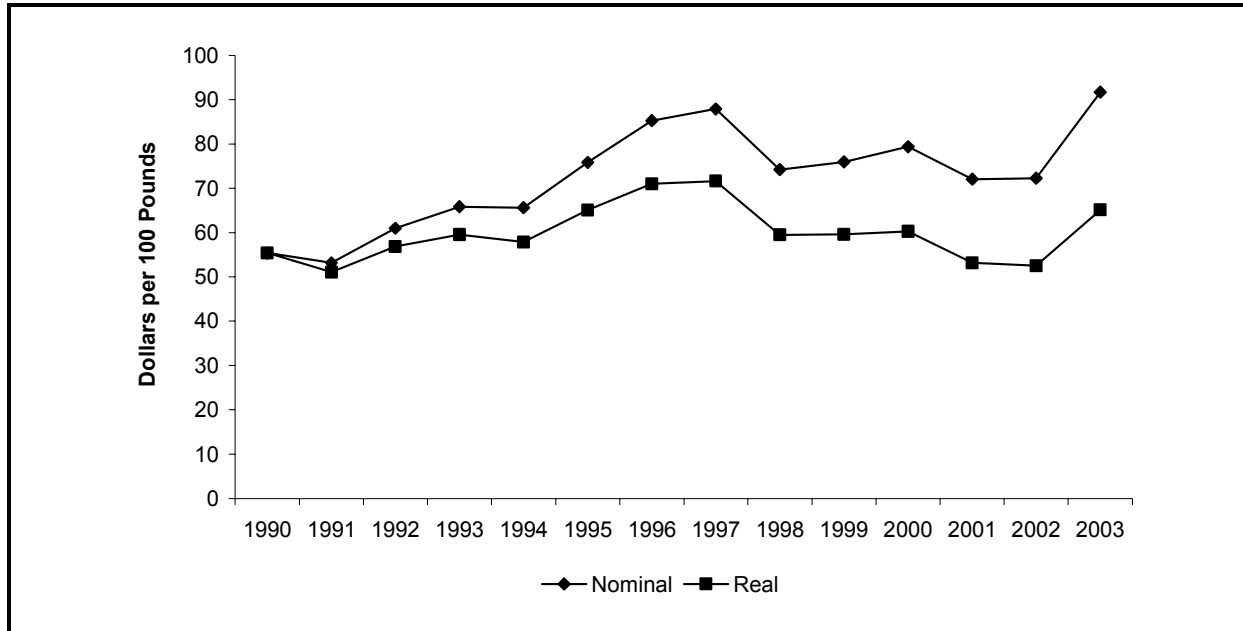
2.3.5 Lamb Prices

The overall decline in sheep inventories and increase in alternative marketing practices have increased the number of auction markets that are thinly traded.

In large part, lamb prices are subject to seasonal variation because of the seasonal availability of slaughter lambs. As discussed above, sheep naturally breed during the fall and lamb the following spring. Subsequently, many lambs are ready for market a few months later and prices decline during the period of greatest supply. Figure 2-31 displays prices received for Choice slaughter lambs in San Angelo, Texas, from 1990 to 2003. The San Angelo price is frequently referenced because it is the largest sheep auction in the country. The overall decline in sheep inventories and increase in alternative marketing practices have led to an increase in the number of auction

Figure 2-31. Slaughter Lamb Price, Choice, San Angelo, 1990–2003

The San Angelo, Texas, auction is the largest operating sheep auction in the country. Real prices are equal to nominal prices adjusted (deflated) to account for inflation.



Note: Prices were deflated by the consumer price index for all urban consumers (1990 = 100) (U.S. Bureau of Labor Statistics. "Consumer Price Index-All Urban Consumers, U.S. All Items." <http://data.bls.gov/cgi-bin/surveymost?cu>. Accessed April 18, 2005.)

Source: U.S. Department of Agriculture, Economic Research Service. 2004g. "Red Meat Yearbook." Stock #94006. Washington, DC. <<http://usda.mannlib.cornell.edu/data-sets/livestock/94006/>>.

markets that are thinly traded. Sheep and lamb contracts are not traded in the futures markets; thus, no futures prices are available.

2.4 DOWNSTREAM MEAT INDUSTRIES—WHOLESALE, EXPORTERS, FOOD SERVICE OPERATORS, AND RETAILERS

Over the past several decades, patterns of U.S. meat consumption have been affected by changes in relative prices for meat, consumer income levels, and tastes and preferences for meat and poultry. Changes in beef and pork consumption and prices relative to poultry are discussed below, prior to discussing changes in the location of meat consumption (e.g., food consumed at home versus away from home).

2.4.1 Comparisons of Consumption and Retail Prices for Beef, Pork, Lamb, and Poultry

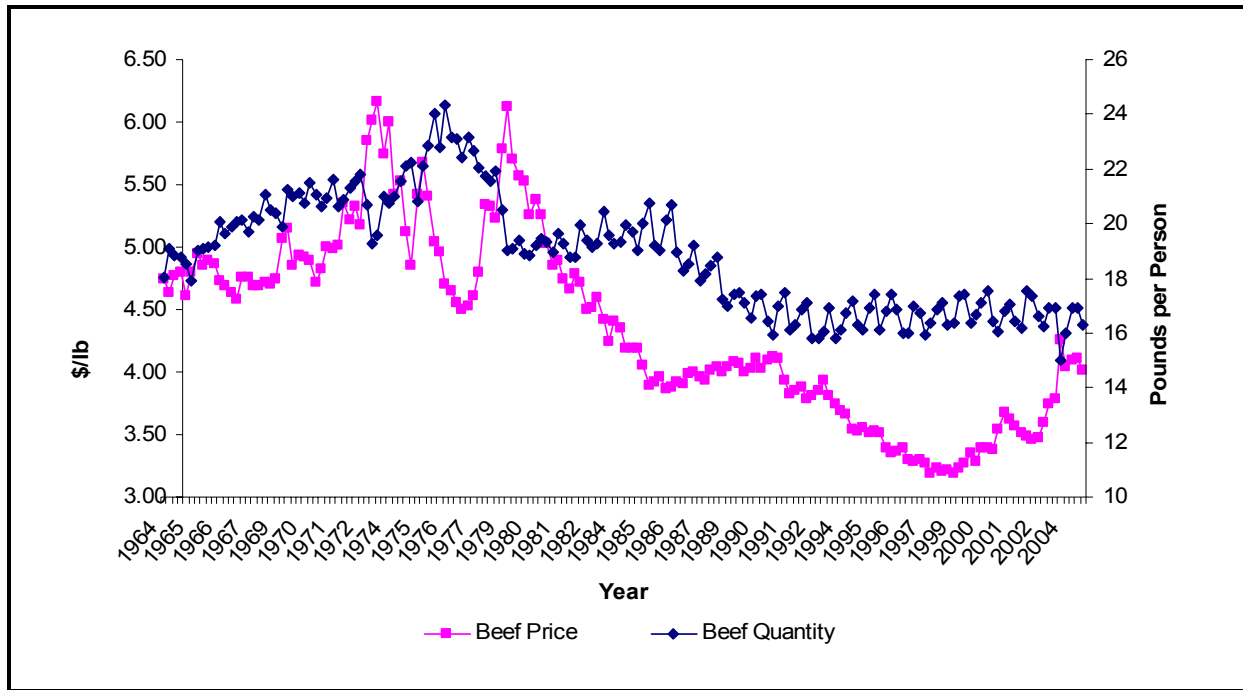
Figure 2-32 reveals that U.S. beef consumption is quite seasonal with consumption in the second and third quarters typically being higher than consumption in the first and fourth quarters. Over the period 1964 to 2004, per capita beef consumption has averaged around 18.8 pounds per quarter (approximately 75.3 pounds per capita annually). Per capita beef consumption levels have also been quite variable over this time period, ranging from as little as 15.0 pounds in the fourth quarter of 2003 to as much as 24.3 pounds in the third quarter of 1976 and have been generally trending lower. U.S. quarterly real retail beef prices measured in 2004 dollars have trended lower over the entire period. During the mid to late 1970s, real retail beef prices exceeded \$6.00 per pound for several quarters, reaching a peak of \$6.16 per pound (in 2004 dollars) in the third quarter of 1973. After this peak, real retail beef prices decreased dramatically for a period of 6 years to a level just below \$4.00 per pound in the mid 1980s. Prices remained steady around this level for a period of approximately 6 additional years before declining significantly again, this time to as low as \$3.20 per pound (in 2004 dollars) in the first quarter of 1999. Since then real prices have been on the rise again and are back above the \$4.00-per-pound level.

Juxtaposing the beef quarterly per capita consumption levels with the beef real retail price reveals that an inverse relationship between prices and consumption levels we expect to see has weakened over the period from 1964 to 2004.

Juxtaposing the beef quarterly per capita consumption levels with the beef real retail price reveals that an inverse relationship between prices and consumption levels we expect to see has weakened over the period from 1964 to 2004. This inverse relationship was quite prevalent up to the early 1980s, and then consumption levels appear to have become less responsive to changes in real retail prices. For example, during the price declines from 1992 to 1999, consumption levels remained relatively stable, although still quite seasonal at around 17 pounds per capita per quarter. The seemingly weaker inverse price and quantity relationship appeared to rebound when the significant price spike in the last quarter of 2003 coincided with a considerable, though temporary, decline in consumption levels. After the price spike tempered, consumption levels were reestablished at previous levels.

Figure 2-32. U.S. Quarterly Per Capita Beef Consumption (lbs per person) and Real Retail Beef Price (\$/lb) (2004 dollars), 1964–2004

The inverse relationship between beef prices and beef consumption has weakened over time.



Sources: U.S. Department of Agriculture, Economic Research Service. 2004g. "Red Meat Yearbook." Stock #94006. Washington, DC. <<http://usda.mannlib.cornell.edu/data-sets/livestock/94006/>>.

U.S. Department of Agriculture, Economic Research Service. 1994. "Livestock and Meat Statistics." Red Meats Yearbook, Statistical Bulletin No. 885. Washington, DC, USDA.

U.S. Department of Agriculture, Economic Research Service. 2005. *Livestock, Dairy, & Poultry Outlook*. Washington, DC: USDA. <<http://www.ers.usda.gov/publications/ldp/>>.

U.S. Bureau of Labor Statistics. "Consumer Price Index-All Urban Consumers, U.S. All Items." <http://data.bls.gov/cgi-bin/surveymost?cu>. Accessed April 18, 2005.

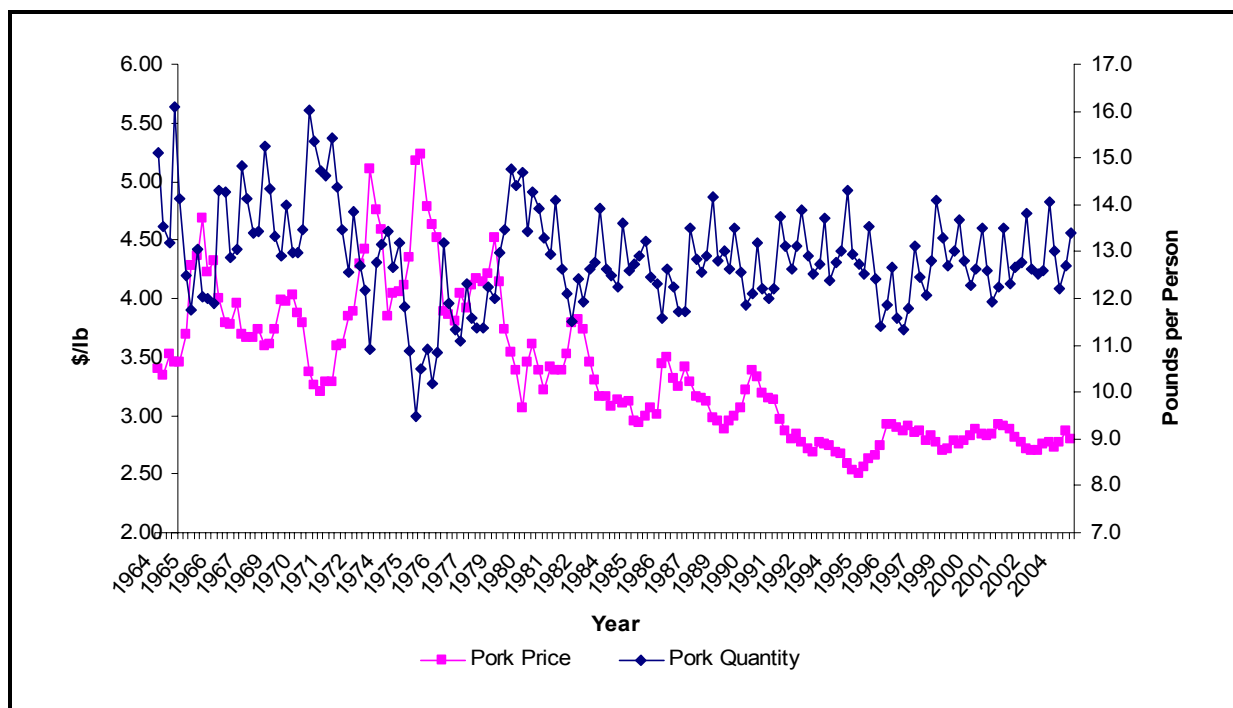
U.S. Department of Commerce, Bureau of Economic Analysis. National Income and Product Accounts Table, Table 2.6 Personal Income and Its Disposition, Monthly. Washington, DC: USDA. <<http://www.bea.gov/nea/dn/nipaweb/SelectTable.asp?Selected=N>>.

U.S. Department of Agriculture, Economic Research Service. 2004c. "Food Consumption (Per Capita) Data System, Food Availability." Washington, DC. <<http://www.ers.usda.gov/data/foodconsumption/FoodAvailSpreadsheets.htm#mtpcc>>.

Figure 2-33 reveals U.S. quarterly pork consumption is seasonal but has remained a steady 13 pounds per capita (approximately 51.5 pounds per capita annually) over the period 1964 to 2004. Per capita pork consumption levels have also been much less variable over this time period compared to beef. Per capita pork consumption declined to as little as 9.5 pounds in the third quarter of 1975 and was as much as 16.1 pounds in the fourth quarter of 1964. U.S. quarterly real retail pork prices measured in 2004 dollars have trended lower over the entire period. During the mid-1970s, real retail pork prices exceeded \$5.00 per pound, reaching a peak of \$5.23 per

Figure 2-33. U.S. Quarterly Per Capita Pork Consumption (lbs per person) and Real Retail Pork Price (\$/lb) (2004 dollars), 1964–2004

As with beef, the inverse relationship between pork prices and pork consumption has weakened over time.



Sources: U.S. Department of Agriculture, Economic Research Service. 2004g. "Red Meat Yearbook." Stock #94006. Washington, DC. <<http://usda.mannlib.cornell.edu/data-sets/livestock/94006/>>.

U.S. Department of Agriculture, Economic Research Service. 1994. "Livestock and Meat Statistics." Red Meats Yearbook, Statistical Bulletin No. 885. Washington, DC, USDA.

U.S. Department of Agriculture, Economic Research Service. 2005. *Livestock, Dairy, & Poultry Outlook*. Washington, DC: USDA. <<http://www.ers.usda.gov/publications/ldp/>>.

U.S. Bureau of Labor Statistics. "Consumer Price Index-All Urban Consumers, U.S. All Items." <http://data.bls.gov/cgi-bin/surveymost?cu>. Accessed April 18, 2005.

U.S. Department of Commerce, Bureau of Economic Analysis. National Income and Product Accounts Table, Table 2.6 Personal Income and Its Disposition, Monthly. Washington, DC: USDA. <<http://www.bea.gov/nea/dn/nipaweb/SelectTable.asp?Selected=N>>.

U.S. Department of Agriculture, Economic Research Service. 2004c. "Food Consumption (Per Capita) Data System, Food Availability." Washington, DC. <<http://www.ers.usda.gov/data/foodconsumption/FoodAvailSpreadsheets.htm#mtpcc>>.

pound (2004 dollars) in the fourth quarter of 1975. After this peak, real retail pork prices have been declining and have most recently stabilized at around the \$2.75-per-pound level.

Juxtaposing the pork quarterly per capita consumption levels with pork real retail prices reveals that, similar to the beef scenario, an inverse relationship between prices and consumption levels we expect to see has also weakened over the period 1964 to 2004. This inverse relationship was quite prevalent up to about the early 1980s, and then consumption

Juxtaposing the pork quarterly per capita consumption levels with pork real retail prices reveals that, similar to the beef scenario, an inverse relationship between prices and consumption levels we expect to see has also weakened over the period 1964 to 2004.

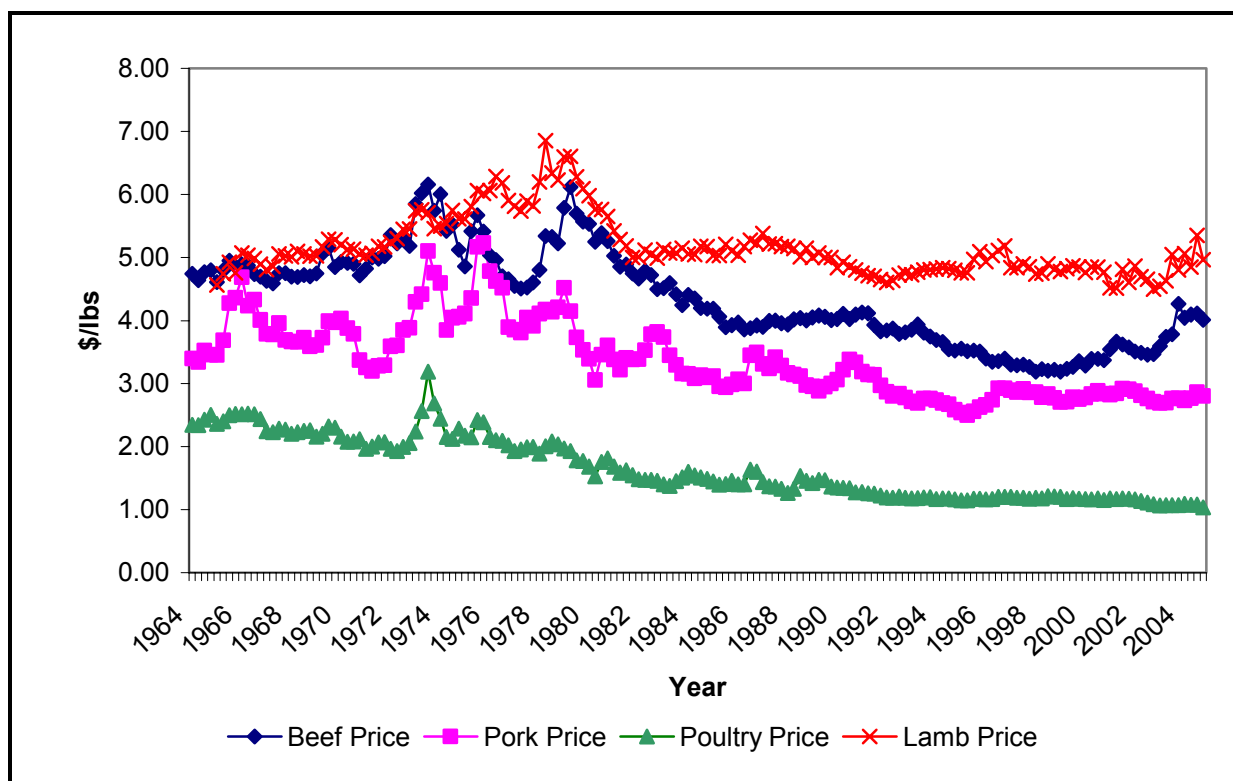
levels appear to have become less responsive to changes in real retail prices.

Figure 2-34 shows how relative real quarterly price levels for beef, pork, lamb, and poultry measured in 2004 dollars have behaved over the period 1964 through 2004. During this period, the ranking of the most expensive to least expensive for the most part remains the same with lamb being the most expensive per pound, closely followed by beef and pork, and then at a significant lower price, poultry. However, in several periods prior to 1975, beef prices were slightly more expensive than lamb prices. During several periods, pork prices have almost been as high as beef for a quarter or so (e.g., in the first quarter of 1966 and the fourth quarter of 1975), and in some periods, all three meats have experienced sharp rises (e.g., in 1974). Overall, the real prices of meat have steadily been declining over the last several decades, and since the mid-1990s, prices have stabilized with an exception being the recent spike in beef prices.

Figure 2-35 shows how the composition of beef, pork, and poultry consumption has changed over the period 1964 through 2004. During this period, total meat (beef, pork, and poultry) per capita consumption on an annual basis has increased 27.8 percent. Specifically, in 1964 per capita consumption of beef, pork, and poultry combined was 171.2 pounds, and in 2004 it was 218.8 pounds (an increase of 47.6 pounds). Figure 2-35 illustrates that this increase can be attributed entirely to the substantial increase of poultry consumption, which averaged 9.7 pounds per quarter in 1964 compared with 25.4 pounds in 2004, an increase of 15.7 pounds per quarter (62.8 pounds on an annual basis). This can be compared with beef and pork consumption levels, which averaged 18.7 and 14.5 pounds per quarter, respectively, in 1964 and were more recently 16.5 and 12.8 pounds per quarter, or 2.2 and 1.7 pounds less, respectively, in 2004. The increase in poultry consumption has been steady over the previous 4 decades, and the decline in beef consumption began in the mid-1970s. Pork consumption has remained relatively stable with only a slight downward trend.

Figure 2-34. U.S. Quarterly Retail Beef, Pork, Lamb, and Poultry Prices (2004 dollars), 1964–2004

The real prices for meat and poultry have been declining over time, but the relative ranking of beef, pork, lamb, and poultry prices has stayed the same.



Sources: U.S. Department of Agriculture, Economic Research Service. 2004g "Red Meat Yearbook." Stock #94006. Washington, DC. <<http://usda.mannlib.cornell.edu/data-sets/livestock/94006/>>.

U.S. Department of Agriculture, Economic Research Service. August 2004f. *Poultry Yearbook*. Washington, DC: USDA. <<http://usda.mannlib.cornell.edu/data-sets/livestock/89007/>>.

U.S. Department of Agriculture, Economic Research Service. 1973. "Livestock and Meat Statistics." Statistical Bulletin No. 522. Washington, DC: USDA.

U.S. Department of Agriculture, Economic Research Service. 1989. "Livestock and Meat Statistics." Statistical Bulletin No. 784. Washington, DC: USDA.

U.S. Department of Agriculture, Economic Research Service. 1994. "Livestock and Meat Statistics." Red Meats Yearbook, Statistical Bulletin No. 885. Washington, DC: USDA.

U.S. Department of Agriculture, Economic Research Service. 2005. *Livestock, Dairy, & Poultry Outlook*. Washington, DC: USDA. <<http://www.ers.usda.gov/publications/ldp/>>.

U.S. Bureau of Labor Statistics. "Consumer Price Index-All Urban Consumers, U.S. All Items." <http://data.bls.gov/cgi-bin/surveymost?cu>. Accessed April 18, 2005.

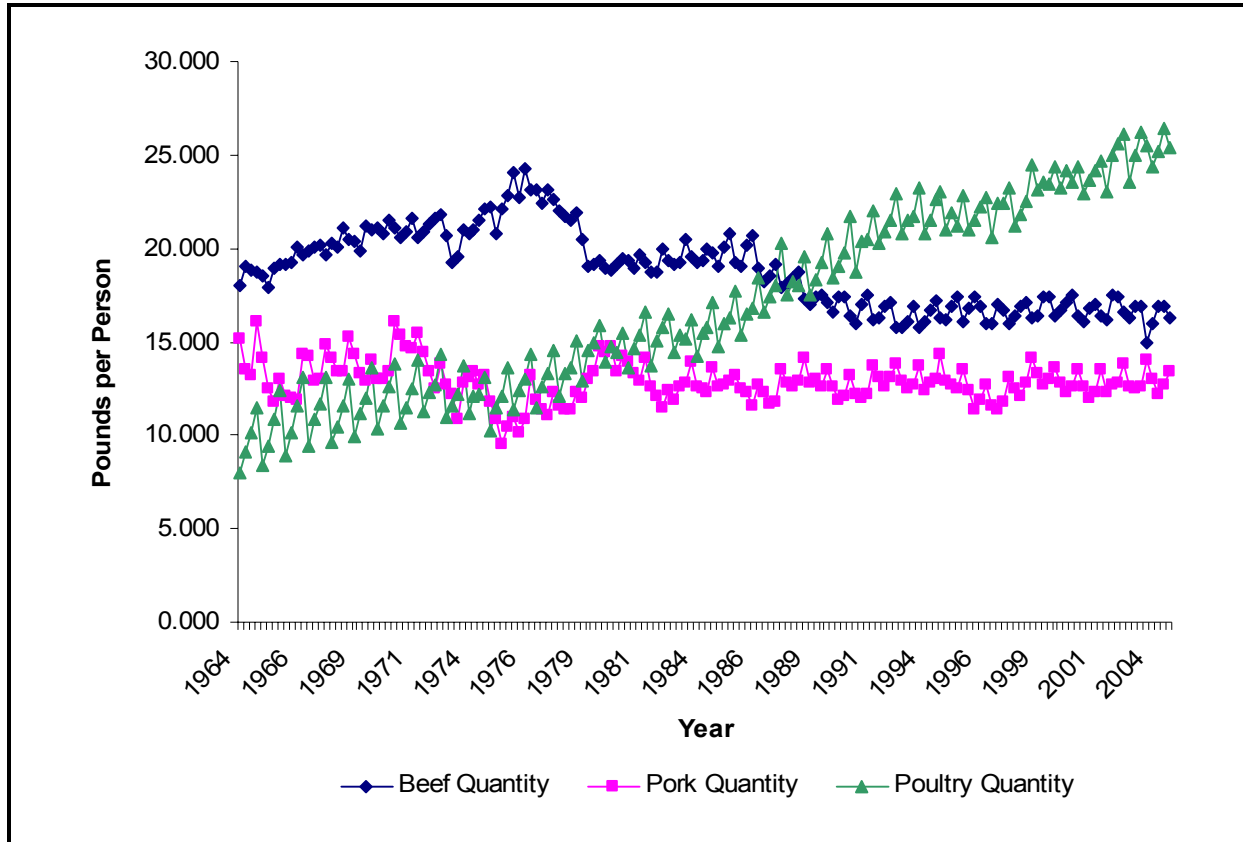
American Sheep Industry (ASI) Association. 2003/2004. "U.S. Sheep Industry Market Situation Report." Centennial, CO: ASI.

McDonnell, T., ASI. 2005. Personal communication with the study team.

Lamb consumption is not shown in Figure 2-35 because its scale in comparison to beef, pork, and poultry is extremely small. In the late 1960s, quarterly per capita lamb consumption was approximately 0.8 pounds, and this trended downward until 1980. Since then, lamb consumption has remained flat at approximately 0.3 pounds per person per quarter.

Figure 2-35. U.S. Quarterly Per Capita Beef, Pork, and Poultry Consumption (lbs per person), 1964–2004

Per capita meat and poultry consumption has increased over time, but the majority of the increase is due to increased poultry consumption. Lamb consumption is not included in the graph because it will appear only slightly above the horizontal axis.



Sources: U.S. Department of Agriculture, Economic Research Service. 2004g "Red Meat Yearbook." Stock #94006. Washington, DC. <<http://usda.mannlib.cornell.edu/data-sets/livestock/94006/>>.

U.S. Department of Agriculture, Economic Research Service. August 2004f. *Poultry Yearbook*. Washington, DC: USDA. <<http://usda.mannlib.cornell.edu/data-sets/livestock/89007/>>.

U.S. Department of Agriculture, Economic Research Service. 1994. "Livestock and Meat Statistics." Red Meat Yearbook, Statistical Bulletin No. 885. Washington, DC: USDA.

U.S. Department of Agriculture, Economic Research Service. 2005. *Livestock, Dairy, & Poultry Outlook*. Washington, DC: USDA. <<http://www.ers.usda.gov/publications/ldp/>>.

U.S. Department of Commerce, Bureau of Economic Analysis. National Income and Product Accounts Table, Table 2.6 Personal Income and Its Disposition, Monthly. Washington, DC: USDA. <<http://www.bea.gov/bea/dn/nipaweb/SelectTable.asp?Selected=N>>.

U.S. Department of Agriculture, Economic Research Service. 2004c. "Food Consumption (Per Capita) Data System, Food Availability." Washington, DC. <<http://www.ers.usda.gov/data/foodconsumption/FoodAvailSpreadsheets.htm#mtpcc>>.

2.4.2 Changes in Patterns of Meat Sales by Food Service Operators and Retailers

In 2003, consumers in the United States spent approximately \$904 billion on food. These expenditures comprise \$497 billion spent on food at home and \$407 billion spent on food away from home (USDA-ERS, 2003, 2004a). Food expenditures by

families and individuals accounted for 10.3 percent of disposable personal income in 2003, down from 12.5 percent in 1980. Food store sales reached \$370 billion, accounting for over 74 percent of food-at-home sales. Food store sales have grown relatively slowly in recent years because of slow population growth and aggressive competition from other retailers, including mass merchandisers and warehouse club outlets.

Fresh meat, poultry, and fish sales comprised 13.3 percent of supermarket sales, making meat, poultry, and fish one of the highest selling categories in retail stores (Food Marketing Institute, 2004). The 2004 National Meat Case Study found that beef, pork, and chicken represented 90 percent of fresh meat in terms of linear feet. Beef's share was 43 percent, pork's share was 22 percent, and chicken's share was 25 percent. The study also found that lamb's meat case representation grew in 2004, while veal's declined.

Merchandising strategies for the total meat department appear to be shifting, resulting in a 6 percentage point decline for fresh meat and poultry's share of total linear feet and a corresponding increase in the share of linear feet for processed meats, ready-to-eat products, and ready-to-cook products. Pork had the highest percentage of ready-to-eat packages, followed by turkey at 8 percent, chicken at 6 percent, and whole muscle beef at 4 percent.

The 2004 National Meat Case Study also found the following:

- Twenty-two percent of all meat packages carried a natural claim.
- Enhanced product represented 21 percent of all packages, with pork having the largest share at 45 percent followed by chicken with 23 percent and beef with 16 percent.
- A strong shift from in-store packaging of fresh meat products to packages prepared off-site was evident (case ready increased from 49 percent in 2002 to 60 percent in 2004, with poultry having the largest share followed by ground beef, pork, lamb, veal, and whole muscle beef).
- Supplier-branded packages have become more prominent, with half of all self-serve packages carrying a supplier brand and 12 percent having a store brand (supplier-branded packages were most prominent in

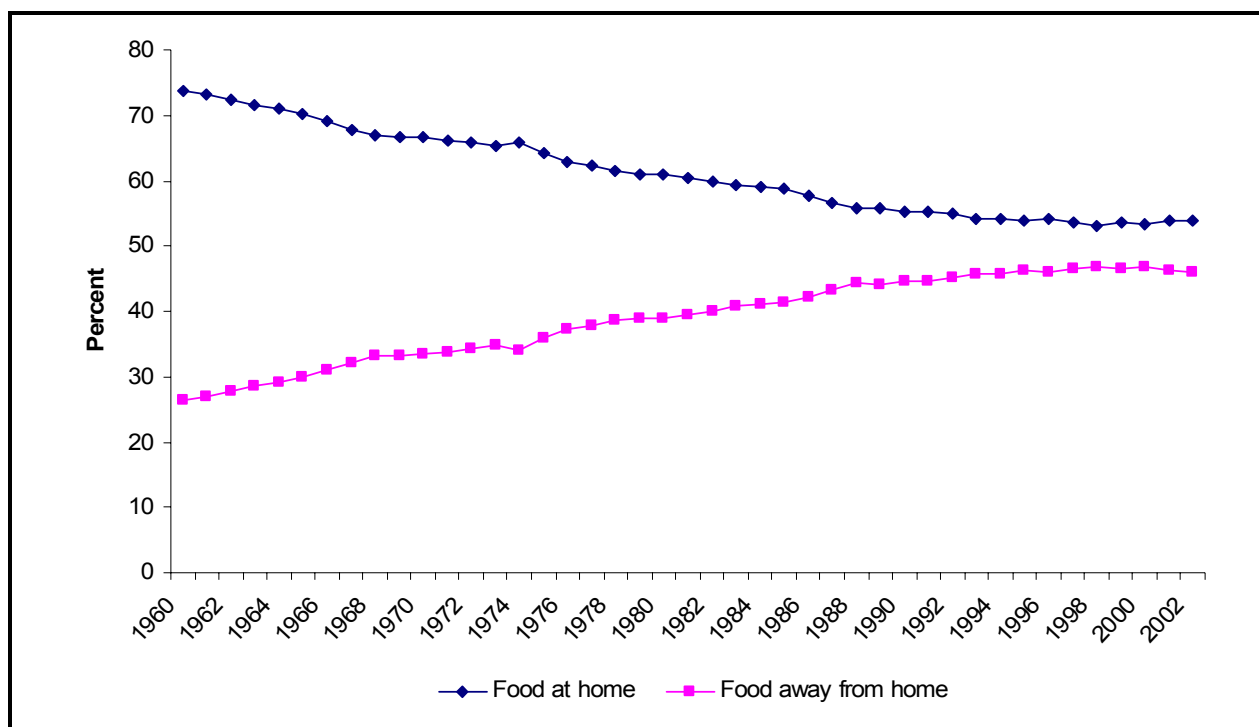
turkey with 86 percent, chicken with 77 percent, and pork with 56 percent, but the majority of beef packages were not branded).

Food service firms exhibit a similar pattern of slow growth and intense competition.

Food service firms exhibit a similar pattern of slow growth and intense competition. Restaurants accounted for almost 331 billion, or 81 percent, of total food service sales. As shown in Figure 2-36, consumers are currently spending nearly half their food expenditures at restaurants and take-out establishments.

Figure 2-36. Expenditures for Food at Home and Food Away from Home, 1960–2002

Expenditures on food away from home have increased steadily, while expenditures on food consumed at home have decreased steadily.



Source: U.S. Department of Agriculture, Economic Research Service. 2004a. Briefing Room-Food Market Structures: Food Service. ERS Food Expenditure Series. <<http://www.ers.usda.gov/Briefing/FoodMarketStructures/foodservice.asp>>.

The relative expansion of the fast food market segment appears to have stalled in recent years. In 2002, sales at full-service restaurants accounted for a slightly larger share of total away-from-home food. Also, for meals eaten at home, an increasing number of those meals are fully prepared or partially prepared by outside sources. Supermarkets are attempting to regain food dollars lost to the food service industry by offering a menu of fully prepared meals. It is likely that the opportunity offered by

food service for food retailing is quite large because demographic factors are changing the way that people eat.

Large food service chains are continuing to gain market share. The top 50 U.S. restaurant franchisers accounted for 39 percent of separate eating place sales in 2000 compared with 28 percent in 1999 (Harris et al., 2002).

This consolidation has resulted in the emergence of very large retail groups, such as Kroger, Albertson's, Safeway, WalMart, and Ahold USA.

Competition in the retail sector from nontraditional retailers has been the catalyst for a wave of consolidation and transformation, which has seen the continued rise of supermarkets and hypermarkets and the steady decline of small traditional retail outlets.⁷ For many food retailers, consolidation is driven by the competitive threat of WalMart and other discount retailers that have added retail food sales to their stores. This consolidation has resulted in the emergence of very large retail groups, such as Kroger, Albertson's, Safeway, WalMart, and Ahold USA. As shown in Figure 2-37, the top-four food retailers account for about 31.9 percent of U.S. retail food sales in 2001 as compared with 19 percent for the top-four food retailers in 1997.⁸

The changes in consumer expectations in terms of product quality as well as the search for profitable niche markets have led retailers to modify their merchandising and purchasing practices in the meat, fruit, and vegetable sectors.

The mergers among the large retailers are part of a strategy to seek additional growth opportunities and cost savings in the form of lower procurement costs and lower operating costs. Retailers are also attempting to gain sales by providing products that increase satisfaction to consumers who are characterized as time-starved, nutrition conscious, quality conscious, and environmentally conscious. These efforts include introducing natural food products, expanding prepared food offerings, promoting store or private-label brands, expanding frequent shopper programs, and introducing self-service checkouts.

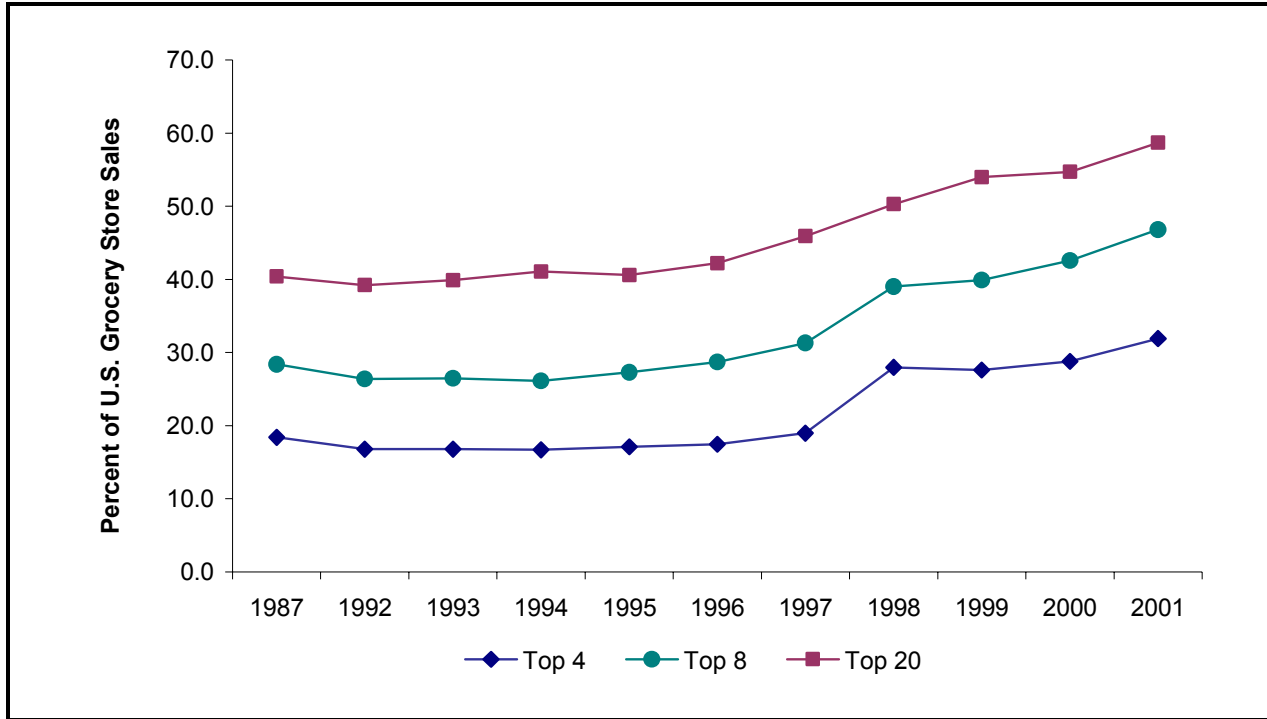
The changes in consumer expectations in terms of product quality as well as the search for profitable niche markets have led retailers to modify their merchandising and purchasing practices in the meat, fruit, and vegetable sectors. These retailer initiatives have resulted in increased segmentation of

⁷A hypermarket is a store that combines a supermarket and a department store. In the United States, WalMart, Fred Meyer (part of the Kroger chain), Meijer, and Target operate hypermarkets.

⁸National concentration ratios may not be reflective of actual market power because supermarkets tend to compete on a local level.

Figure 2-37. Four-Firm Concentration Ratios (CR4s) for Grocery Retailers, 1987–2001^a

The grocery retail sector has increased substantially since the mid-1990s.



^aRatios based on the North American Industry Classification System (NAICS) reclassifies some retail sales, resulting in higher concentration shares than under the previous Standard Industrial Code (SIC) classification system.

Source: U.S. Department of Agriculture, Economic Research Service. 2003. Briefing Room-Food Market Structures: Food Retailing. ERS Food Expenditure Series. <<http://www.ers.usda.gov/Briefing/FoodMarketStructures/foodretailing.htm>>.

product offerings on store shelves and in the meat case. Retailers now offer, in addition to standard products, differentiated products focusing on health, convenience, taste, and information about how the food was produced. For example, several meat processors now offer case-ready branded meats to satisfy large retailers. As closer relationships are formed, processors are increasingly using alternative marketing arrangements to improve the quality of animal production and to ensure traceback capabilities.

New technologies, such as source verification (Meyer, 2001), are being developed to meet consumers' expectations for a healthy, safe product. Source verification systems allow the meat system to identify locations where problems exist and allow producers to track livestock as they move through the system, thereby providing information on quality. Producers can use this information to improve their decisions regarding production methods to better meet consumer demands.

3

Literature Review on Spot and Alternative Marketing Arrangements

The literature review addresses both general economic theory and empirical literature for each of the meat species.

This section summarizes the relevant literature related to themes in Parts A and B of the study. First, the theoretical literature related to economic theories of the firm and vertical integration and coordination is reviewed. Then, the literature is summarized for each species and meat type related to types of spot and alternative marketing arrangement used, terms used in alternative marketing arrangements, factors affecting availability of alternative marketing arrangements, and stated reasons for using them. Relatively little economic research has been conducted on marketing arrangements used for meat in the downstream industries; however, limited discussion of the downstream industries is provided in the species-specific discussions below.

3.1 THEORETICAL LITERATURE ON VERTICAL COORDINATION AND USE OF MARKETING ARRANGEMENTS

This section presents the general theoretical literature related to theories of the firm, vertical integration and coordination, and complementarities in organizational design. A review of the general literature aids in understanding the discussion of vertical integration and coordination in the livestock and meat industries presented later in this section.

3.1.1 Theories of the Firm and Vertical Integration

The four elemental theories of the firm are

- transactions costs (rent-seeking) theory,
- property rights (incomplete contracts) theory,
- incentive-system (or agency) theory, and
- adaptation theory.

Formal Theories and Empirical Tests

Fundamental economic questions of interest are: What alternatives does the firm have for organizing its activities? Why does it rely on independent suppliers for some services and its own divisions for others? What determines which services are (or should be) purchased from outside suppliers and which should the firm provide for itself? Therefore, any theory of the firm must explain integration (i.e., whether a given transaction occurs within one firm or on the market) and should be able to predict integration for some transactions and nonintegration for others (i.e., what trade-offs exist between integration and nonintegration).

The early theories of the firm (transactions costs or rent-seeking) adopted the definition of integration as the unification of control rights and clearly recognized the crucial role of contract imperfections, but they failed to describe a downside to integration. Later, the incomplete contracts theory (the property rights theory), which presented a world with incomplete contracts where ownership conveys the residual rights of control (i.e., all the decision rights not specified in a contract), delivered a unified account of the costs and benefits of integration. Another formal theory of the firm, labeled the incentive-system theory (agency theory), focuses on the internal incentive problems within the firm. By focusing on incentives instead of on the make-or-buy problem that motivated the first two theories, this theory emphasizes the importance of multitasking and job design. Finally, Gibbons (2004) discusses the adaptation theory of the firm, which asks whether integration or nonintegration better facilitates adaptive and sequential decision making in environments where uncertainty is resolved over time.

The origins of the **transactions costs theory** can be traced back to Coase (1937). Coase focused on the costs of transacting in different organizational environments, particularly the cost of writing, executing, and enforcing contracts. He argued that an organization is designed to minimize the transactions costs of doing business between parties. Expanding on Coase's ideas, Williamson (1985) argued that economizing on transactions costs is the primary motivation for adopting different structures governing the contractual relationship between parties. For

example, if the transactions between the two parties (buyer and supplier) are recurrent and involve high levels of specific investment (i.e., idiosyncratic transactions), the two will have a strong incentive to vertically integrate. Signing the contract to govern this relationship may not adequately prevent the hold-up problem from occurring.¹ The reason for this is that it is impossible to stipulate in advance the exact response to all future contingencies (i.e., the complete contract is costly and most of the time impossible to write). Specifically, the buyer may renege on the contract by threatening not to buy from the supplier at the specified contract price should some unanticipated event occur. The supplier, who incurred the investment, has no choice but to accept the unfair lower price. Without the vertical integration between the buyer and the supplier, the rational supplier will be reluctant to invest in the first place because of the fear of opportunistic behavior of the buyer.

When firms require specialized inputs that have higher value inside the contractual relationship than in an open market, they must decide if they will produce those inputs themselves or purchase them either on the spot market or by entering into a long-term contract.

The Coase-Williamson idea has been widely tested. In particular, the theory of relationship-specific investment² and the scope of the firm have been tested extensively in the area of industrial procurement. When firms require specialized inputs that have higher value inside the contractual relationship than in an open market, they must decide if they will produce those inputs themselves or purchase them either on the spot market or by entering into a long-term contract. The trade-off between production efficiency and the severity of hold-up governs the choice of length and flexibility of the procurement contracts when transactions involve physically specific assets. Joskow (1985, 1987, 1990), Masten (1984), Monteverde and Teece (1982), Levy (1985), John and Weitz (1988), and Maher (1997) all adopt similar research strategies to empirically test the theory. These authors collected data on contractual forms and measures of physical asset specificity in various contexts.

¹The general business problem in which each party to a contract worries about being forced to accept disadvantageous terms later, after it has sunk an investment, or worries that its investment may be devalued by the actions of others, is called the **hold-up problem** (Milgrom and Roberts, 1992).

²Assets or investments are considered “relationship specific” if their value outside the particular relationship, say outside a contract between an integrator and a grower, is significantly reduced (Vukina and Leegomonchai, 2006).

Simple spot markets are used less frequently relative to other organizational forms, such as long-term contracts or vertical integration, when assets are more relationship specific.

For example, in Joskow's series of papers, the relevant assets are coal mines and power plants. They show that simple spot markets are used less frequently relative to other organizational forms, such as long-term contracts or vertical integration, when assets are more relationship specific. The empirical testing of the transactions costs theory suggests that the direct evidence of one party being held up is rather rare. This is because parties are aware of such problems and adopt suitable institutional arrangements to address the problem of expropriation in advance. Without these mechanisms, parties would be reluctant to invest, or their investment level would be suboptimal. For example, coal mines eventually sign long-term contracts or vertically integrate with electricity firms (Joskow, 1987). Similarly, the empirical evidence of hold-up in franchising contracts, which are organizationally very similar to livestock production contracts, appears to be quite rare as well (Beales and Muris, 1995).

While the empirical work was providing confirmation for the transactions costs theory, a related and more formal property rights theory of vertical integration emerged in the works of Grossman and Hart (1986), Hart and Moore (1990), and Hart (1995). Like the transactions costs approach, the **property rights or incomplete contracts theory** takes the incompleteness of contracts and existence of *ex-post* quasi-rents³ as critical to understanding hold-up. The incomplete contracts theory then focuses on how ownership of physical assets, which confers residual rights of control over these assets, alters the efficiency of trading relationships (Whinston, 2003).

The property rights theory is similar to the transactions costs theory in the sense that it addresses the make-or-buy decision through incomplete contracts that are incomplete because of bounded rationality of economic agents (also, commitment is impossible because of opportunism) and that the contracting parties are bilaterally dependent because of asset specificity. According to Williamson (2000), "The most consequential difference between the TCE (transaction cost economics) and GHM (Grossman-Hart-Moore) setups is that the former holds

³Quasi-rent is defined as the value of an asset in excess of its next best alternative use (Klein, Crawford, and Alchian, 1978).

that maladaptation in the contract execution interval is the principal source of inefficiency, whereas GHM vaporize *ex post* maladaptation by their assumptions of common knowledge and costless bargaining.” The meaning of this is that the rent-seeking theory envisions socially destructive haggling *ex post*, and the property rights theory assumes efficient bargaining. Also, the rent-seeking theory is consistent with contractible-specific investments, whereas the property rights theory requires noncontractible specific investments (Gibbons, 2004). Consequently, the inefficiencies in GHM are concentrated in *ex-ante* investments in human capital, which are conditional on the ownership of physical assets.

Recently, addressing the problem of hold-up in broiler industry production contracts, Vukina and Leegomonchai (2006) tested the predictions of the property rights (incomplete contracts) theory of the firm. They constructed several tests of hold-up and empirically verified the derived propositions by using a cross-sectional national survey of broiler growers. They hypothesized the presence of grower underinvestment in housing facilities and predict that the degree of underinvestment will be related to the number of processors competing for grower services in a given area and to the level of investment specificity. Stronger competition and more generic investments should lead to smaller underinvestment problems.

Using the efficiency wage with asset specificity model, they also provided an indirect test of hold-up by looking at the grower contract payoffs as a function of the frequency of the technology upgrade requests and the processor’s market power. They hypothesized that broiler integrators may force high levels of asset specificity onto growers, thereby alleviating the need for high-efficiency wages. The results were mixed. Based on the property rights model (the underinvestment hypotheses), the results were, at least partially, supportive of the prediction that growers’ relationship-specific investments depend systematically on the processors’ market power and the degree of asset specificity. The indirect test of hold-up, where they predict that the increase in asset specificity would enable a fall in grower compensation rate, was empirically verified only when the integrator was a monopsonist. The hypothesis did not hold in other more competitive market structures.

Firms own assets because this mutes the incentives that come with the individual asset ownership, allowing the firm to operate as a “subeconomy” that can more precisely balance incentives and implement more complex multitask job designs.

The **incentive-system (or agency) theory of the firm** can be discerned in formal models by Holmstrom and Milgrom (1991, 1994), Holmstrom and Tirole (1991), and Holmstrom (1999). Holmstrom and Milgrom (1994) argued that firms’ boundaries reflect trade-offs in which asset ownership interacts with job design and other organizational decisions. Therefore, firms’ boundaries may reflect factors that do not appear in Grossman and Hart’s (1986) theory, including those that affect the optimal allocation of tasks across individuals. Holmstrom (1999) offered a critique of the property rights theory in which he argued that the property rights theory failed to explain why firms rather than individuals own assets. He explained that firms own assets because this mutes the incentives that come with the individual asset ownership, allowing the firm to operate as a “subeconomy” that can more precisely balance incentives and implement more complex multitask job designs. As summarized by Gibbons (2004), the distinctive point of the incentive-system theory is that asset ownership can be an instrument in a multitask incentive problem. Asset ownership has both direct effects (incentives from asset value) and indirect effects (changes in the optimal incentive contract). Joint optimization over asset ownership and contract parameters illustrates the system approach to incentive problems.

The agency theory of the firm has also been tested empirically. For example, Baker and Hubbard (2003) developed a model of asset ownership in trucking, which they test by examining how the adoption of different classes of onboard computers influenced whether shippers used their own trucks or contracted with for-hire carriers. They argued that the pattern of asset ownership in trucking reflects not only the factors identified by the property rights theory but also those highlighted by the agency theory. Consistent with the former, ownership patterns reflect trade-offs arising from providing for-hire carriers with strong incentives to identify profitable uses for trucks. Consistent with the latter, ownership patterns also reflect issues of job design (i.e., the degree to which drivers simply drive trucks or provide a more complex combination of transportation and service). Job design matters because service-intensive trucking hinders the ability of for-hire carriers to find profitable uses for trucks. Shipper ownership of trucks

creates incentives and favors service-intensive trucking in which drivers' jobs involve more than just driving trucks.

Finally, the **adaptation theory** of the firm can be discerned in informal theoretical arguments by Klein and Murphy (1988, 1997) and Klein (1996, 2000). The theoretical challenge of this theory is to define an environment in which, neither *ex-ante* contracts nor *ex-post* renegotiation can induce the first-best adaptation to resolved uncertainties. Therefore, the second-best solution may be to concentrate the authority in the hands of a "boss," who makes all decisions after uncertainties are resolved. This emphasis on the authority and control links the adaptation theory with the rent-seeking theory, whereas the incentive-system theory ignores control in favor of incentives, and the property rights theory blends the two together (Gibbons, 2004).

Complementarities in Organizational Design

The modern theory of the firm has made considerable progress in explaining the determinants of vertical integration and firm boundaries, assuming that the level of vertical integration results from independent transactional choices by the firm. However, for most organizations, firm boundaries are not determined by independent vertical integration decisions but depend on interrelated choices spanning functional activities. For example, in the livestock and meat industries, the degree of vertical integration for a packer is the consequence of many individual procurement choices, ranging from simple oral or handshake procurement arrangements to complex production contracts. Moreover, individual contracting choices are frequently interdependent with other contracting decisions. The decision to outsource a single function affects the vertical integration calculation for related procurement decisions, especially if overall performance depends on coordination among agents responsible for these two functional areas and the degree of coordination is sensitive to governance structure (see Novak and Stern [2003]).

A common finding of the early empirical literature on organizations in firms (e.g., Arora and Gambardella [1990]; MacDuffie [1995]) was that organizational design practices are clustered—meaning that the adoption of one practice is correlated with the adoption of other practices; consequently, clusters of practices consistently appear together. As a result, a

For most organizations, firm boundaries are not determined by independent vertical integration decisions but depend on interrelated choices spanning functional activities.

rich theoretical debate has arisen attempting to explain clustered organizational practices, with implications for adoption and performance. Similar theoretical perspectives developed in both organization economics and business strategy have suggested that interdependencies among practices can be crucial for determining the payoffs for individual practices (Milgrom and Roberts, 1990; Levinthal, 1997). An important line of literature has emphasized the potential for **complementarity**, which is defined as positive interdependencies among pairs of practices (Milgrom and Roberts, 1990; Holmstrom and Milgrom, 1994; Siggelkow, 2002).

Complementarity among governance choices—sometimes referred to as contracting complementarity, which results when the marginal returns to vertical integration for a given vertical integration choice are increasing in the level of vertical integration on related choices—has been studied by Novak and Stern (2003). The central aims of this study were to identify conditions under which contracting complementarity may have been an important driver of vertical integration decisions and to evaluate the empirical evidence for contracting complementarity in the context of automobile product development governance choices. For each car model in the data set, they observed both the degree of vertical integration and the contracting environment for seven distinct automobile systems (e.g., brake system, the seat system). Across different systems, they observed a similar set of system-specific vertical integration drivers (e.g., for each system, they observe whether the firm has existing in-house sunk investments in plant and equipment). These drivers allowed them to implement an instrumental variables strategy to disentangle whether clustering is due to complementarity or unobservable firm-level fixed effects in governance (e.g., if a firm adopts outsourcing strategy for all systems within the car).

Assuming away contracting complementarity may be problematic in contexts where coordination activities are important yet difficult to monitor.

By observing system-specific variation in the contracting environment, they estimated the sensitivity of vertical integration on one system to the level of vertical integration on other systems within the same car. This was accomplished by including the system-specific measures for a particular system directly as control variables and using the system-specific drivers for the other systems as instruments for the level of vertical integration on the other systems. The findings showed

that the probability of vertical integration for each automobile system increased in the share of other systems that were vertically integrated. Even when system-specific measures of the contracting environment were included, the contracting environment associated with other systems influenced the vertical integration choice for each system. These findings suggest that assuming away contracting complementarity may be problematic in contexts where coordination activities are important yet difficult to monitor.

The empirical results showed that the likelihood that any particular project was outsourced depended not only on its characteristics, but also on the distribution of project characteristics for the firm as a whole.

Azoulay (2003) also highlighted the importance of interrelationships in governance choice by examining the substitutability among vertical integration decisions in product development. Critical of the transactions costs theory of the firm for ignoring the fact that firm boundaries are not determined by a single isolated vertical integration decision, Azoulay argued that diseconomies of scope can create interdependencies between contracting choices. This argument was tested in a detailed study of outsourcing in clinical development. Since the mid-1980s, pharmaceutical firms have partly contracted out the operational aspects of clinical trials to contract research organizations. Outsourcing can have different implications for human resource management. According to one theory, by buffering a core of insiders with a periphery of contractors who bear the brunt of workload adjustments, the firm removes the threat of downsizing for insiders and credibly signals its intention to deliver on its promise of job stability. As a result, insiders are more likely to engage in creation of firm-specific knowledge. According to another theory, outsourcing can be thought of as an employee discipline device. By indirectly threatening the insiders with layoffs in favor of the external labor pool, partial outsourcing elicits a higher level of effort from insiders. Both of these theories produce diseconomies of scope in the sense that insiders' incentives are always weakened as the range of projects under their purview widens. The empirical results showed that the likelihood that any particular project was outsourced depended not only on its characteristics, but also on the distribution of project characteristics for the firm as a whole. Some projects will be outsourced, even though the insiders could perform them more efficiently. The phenomenon arises because firms weigh the costs of misallocating these projects against the loss of

Many packers have similar technologies and make comparable choices about various procurement arrangements, but they operate in economic environments that are different regarding average farm size, composition of agricultural output, labor markets, and infrastructure.

incentives for all remaining insiders that expanding the scope of the firm would entail.

Most of the above-mentioned studies do not explicitly account for the potential impact of unobserved variation in the costs and benefits of organizational design practices on the interpretation of empirical evidence relating to tests for complementarity or interdependencies. Athey and Stern (2003) developed a formal econometric framework designed to allow a more complete evaluation of why management practices appear together and how joint adoption affects firm-level productivity. They provided sufficient conditions for identification of the structural parameters of the organizational design production function and a consistent test for complementarity. The approach was tailored to cross-sectional applications where many firms face similar production technologies, make comparable choices about organizational design, but face different costs or benefits of adoption. For example, many packers have similar technologies and make comparable choices about various procurement arrangements, but they operate in economic environments that are different regarding average farm size, composition of agricultural output, labor markets, and infrastructure. These packers make interdependent choices about whether to use spot markets, production contracts, marketing contracts, or some combination of the above.

3.1.2 Vertical Integration vs. Coordination

Vertical integration and coordination refer to a firm's external and internal ability to organize along a vertical chain. **Vertical integration** is the control of two adjacent stages in the marketing channel from producers to consumers. **Vertical coordination** encompasses a variety of methods of synchronizing farm-level supplies with retail-level demand (Ward, 2001a). Vertical coordination via market prices is at one extreme on a continuum of vertical coordination, while vertical integration is on the other extreme. Between the two extremes are numerous vertical coordination arrangements, including contracts and strategic alliances.

External coordination relies on the use of spot markets, contracting, and strategic alliances to obtain specific input quality and quantities. This type of coordination refers to price signals to coordinate marketing channels. Such signals are used

in conjunction with well-defined grades and standards to maintain market efficiencies. Furthermore, prices must convey specific information regarding desired attributes throughout the marketing chain.

Vertical Integration

Vertical integration—owning assets in adjacent vertical sectors—allows a firm to coordinate marketing channels internally.

Vertical integration—owning assets in adjacent vertical sectors—allows a firm to coordinate marketing channels internally. The ownership of adjacent assets implies that price signals are replaced by administrative decisions within the marketing chain. The advantages of simple market procurement are greatest when particular circumstances prevail. These include

- the use of standard inputs,
- the presence of many competing suppliers,
- economies of scale in the supply firms that are too large to be duplicated by the buyer,
- economies of scope that would force the vertically integrated firm into unrelated business, and
- the absence of specific investments on the part of either the buyer or the seller.

When these conditions fail, vertical integration can provide significant advantages over simple market procurement (Milgrom and Roberts, 1992). Internal coordination is more likely to occur with increases in a firm's frequency of transactions; office information technology; asset specificity; and uncertainty regarding price, quantity, quality, and timeliness (Barkema and Drabenstott, 1995).

Optimal vertical organization minimizes the sum of technical and agency inefficiencies.

The costs and benefits of using markets are classified as relating to either technical efficiency or agency efficiency (Besanko et al., 2004). **Technical efficiency** represents the degree to which a firm maximizes production from a set of inputs. More broadly, technical efficiency indicates whether a firm is using least-cost production processes. **Agency efficiency** refers to the extent to which the exchange of goods and services in the vertical chain has been organized to minimize coordination, agency, and transactions costs. Agency efficiency involves the process of exchange, whereas technical efficiency concerns the process of production. Optimal vertical organization minimizes the sum of technical and agency inefficiencies (Williamson, 1991). Transactions along the

vertical chain are organized to minimize the sum of production and transactions costs. To the extent that markets are superior for minimizing production costs and vertical integration is superior for minimizing transactions costs, trade-offs exist.

Vertical integration becomes more attractive as economies of scale in production become weaker. That is, firms find that they are better able to take advantage of scale and scope economies than other firms achieve by using market transactions. In addition, firms are more likely to vertically integrate as their market shares increase. Larger market shares imply larger demand for inputs that can increase gains from scale and scope economies. Furthermore, firms are more likely to vertically integrate if the production of inputs involves investments in relationship-specific assets. If assets are highly specific, firms may vertically integrate even if the production of inputs is characterized by strong scale economies or when a firm's market share is small.

Conceptually, several advantages arise from vertical integration:

- **A firm may lower its transactions costs because integration can reduce the need to buy from or sell to other companies.** Essentially, the costs of monitoring switch from monitoring activities of other firms to monitoring employees within a single firm. One expects to see increased vertical coordination when a specialized asset causes a seller to customize processes for a single-source buyer or when a buyer is dependent on a single-source seller. In addition, as uncertainty, informational transactions costs, and requisite coordination activities increase, the likelihood of vertical integration increases.
- **A firm may choose to vertically integrate backwards into a supply chain.** Such actions often seek to reduce uncertainty in delivery schedules and/or input quality.
- **A firm may vertically integrate to internalize externalities.** One example of a desire to capture positive externalities occurs within franchises. A poor experience in one franchised outlet can cause customers to select away from making purchases in other franchised outlets. Hence, a firm may choose to vertically integrate manufacturing and distribution so that *all* franchised outlets are better able to deliver consistent quality.

- **A firm may vertically integrate to reduce the impacts of government intervention.** For example, a firm could avoid government-imposed price controls or monitoring if it sells to itself rather than enter into open-market transactions. Similarly, an integrated firm may be able to reduce tax liabilities by shifting profits among levels of the marketing channel. Such shifting can occur through adjusting transfer prices within the company.
- **A firm may vertically integrate to create or increase market power.** For instance, a vertically integrated firm may have more bargaining power with respect to buyers of a product. In addition, a vertically integrated firm may improve its ability to price discriminate by preventing resale of products.
- **A firm may vertically integrate to offset market power or increase market access.** Agricultural producers have a long history of vertically integrating backward into input supply markets and forward into food-processing industries. Such integration often provides a stable input supply or access to output markets. In addition, such integration often is used to maintain adequate price signals with respect to quality.

Vertical Coordination

Vertical coordination is accomplished by using contracts or alliances rather than ownership of assets within successive stages of production and/or distribution.

Simple market procurement and vertical integration do not exhaust the options open to firms in a vertical supply relationship. Modern firms continue to forge innovative organizational arrangements in their attempts to enjoy the incentive advantages of independent firms, while still facilitating planning, protection of assets from hold-ups, and avoiding monopoly inefficiencies (e.g., double marginalization⁴). The term frequently used for various hybrid organizational forms is vertical coordination.

Vertical coordination is a means of externally organizing a marketing channel (Barkema and Drabenstott, 1995). Vertical coordination is accomplished by using contracts or alliances rather than ownership of assets within successive stages of production and/or distribution (Carlton and Perloff, 1994). For example, manufacturers want products to be distributed at the

⁴Double marginalization or double monopoly markup (Carlton and Perloff, 2005, p. 415) refers to a situation where, say, a producer and a distributor are both monopolies, each adding a monopoly mark-up (the positive difference between price and marginal cost), so consumers face two mark-ups instead of one.

lowest possible costs. In addition, manufacturers may want to place certain restrictions on the location and timeliness of the distribution process. Because of the costs of monitoring employees, however, it may be more efficient to contract with other firms for distribution services. Nonetheless, the manufacturer still has a monitoring problem with respect to the distributor's actions.

Vertical integration and market exchanges are two extremes in vertical coordination. A variety of hybrid forms of organization exist (Besanko et al., 2004):

- **Tapered Integration:** Tapered integration occurs when a firm uses a combination of vertical integration and market transactions. Manufacturers may rely on vertical integration to obtain part of an input, and purchase additional units from others. This approach has four benefits. First, it allows firms to expand while limiting capital outlays. Second, firms can use information regarding production costs when negotiating with other suppliers. Third, firms can use their own input supply chains to protect themselves from input supply hold-ups. Fourth, firms can downsize operations at a lower cost by reducing reliance on purchases from others.
- **Strategic Alliances and Joint Ventures:** A strategic alliance is formed when two or more firms agree to collaborate on a project or share information or resources. A joint venture is a specific type of alliance in which two or more firms jointly create a new firm. Participants in alliances often rely on trust and reciprocity, rather than contracts, to govern these relationships.
- **Implied Contracts and Long-Term Relationships:** Implicit contracts represent understandings between parties in a business relationship. Implicit contracts are seldom enforceable in court, so firms often rely on alternative mechanisms to maintain the viability of the arrangement. The most powerful mechanism is the loss of future business should one party break the contract.

In summary, vertical coordination is an important element of competitive strategy (Boland, Barton, and Domine, 1999). Broadly defined, it refers to various methods used to manage vertical stages of a marketing channel. Three basic types of coordination exist: open market transactions, production and marketing contracts, and ownership of adjacent assets through cooperatives or investor-owned firms.

Spot market transactions are a traditional coordinating mechanism. The approach is still widely used to market commodities. Production and marketing contracts coordinate vertical product purchases and sales and may use formulas to establish prices. Integration represents a coordinating mechanism in which a firm has the greatest control across the marketing channel. Much of this integration occurs through group action—either in the form of producer-owned cooperatives or stock purchases in investor-owned firms.

In addition to cooperatives, Milgrom and Roberts (1992) explore two other options that represent organizational innovations: franchising and supplier organizations (originally used by Japanese automobile companies). All these options are interesting from the perspective of the livestock and meat industries. Cooperatives are omnipresent in agriculture, and there are some indications that they will increase in the future. The concept of franchising is very similar to the concept of production contracts widely used in the hog and poultry industries. Supplier organizations are similar to marketing alliances that are becoming more popular, especially in the beef sector. As firms continue to innovate in this area, the set of options will surely continue to expand.

3.2 EMPIRICAL LITERATURE ON MARKETING ARRANGEMENTS IN THE FED CATTLE AND BEEF INDUSTRIES

Concentration as measured by the CR4 in the U.S. beef packing industry has grown from 35 percent in 1980 to 81 percent in 1993 and has remained relatively stable since then. Over the same period, the industry has employed alternative marketing arrangements to increase the degree of vertical coordination throughout the supply chain. Cattle procured through these “captive supply” methods accounted for 44.4 percent of total cattle slaughtered by the four largest packers in 2002 (USDA-GIPSA, 2004b).

This section summarizes the empirical literature on the effects of captive supplies and reasons for use of alternative marketing

arrangements in the beef industry.⁵ A description of the use of alliances in the beef industry is also provided.

3.2.1 Empirical Literature on the Impact of Captive Supplies

Captive supplies take the following three forms:

- packer-owned cattle fed in packer-owned and commercial feed lots
- fed cattle purchased by fixed price and basis forward contracts
- exclusive marketing and purchasing agreements for securing cattle

Packer-fed cattle are transferred from a feedlot to the slaughter plant when cattle reach slaughter weight, and a transfer price is assigned to the cattle on the day they are slaughtered. **Basis contracting** involves a packer bidding a basis (i.e., cash minus futures market price) for the month that fed cattle are expected to reach slaughter weight. The cattle feeder reserves the right to decide when to price the cattle prior to delivery. Once the cattle are priced, the contract is akin to a forward contract. **Exclusive feedlot marketing** or **packer purchasing agreements** are supply contracts where the cattle feeder agrees to market a specified number of cattle for a specified period to a given buyer. Price is based on a prearranged “grid” or formula, typically consisting of a base price with premiums and discounts associated with variation in cattle quality (Ward, Koontz, and Schroeder, 1998).

As noted in Table 3-1, the percentage of steers and heifers sold by the four largest packers under marketing agreements increased from 20.7 to 32.4 percent from 1999 to 2002. In contrast, packer-fed cattle and other cattle owned by packers more than 14 days prior to slaughter was in the range of 8.5 to 10.9 percent over this time period. Forward-contract cattle accounted for an additional 2 to 3 percent of slaughter.

⁵This review is not intended to present a comprehensive assessment of market power in the beef packing industry. However, the literature addressing market power (as reviewed in Azzam [1998b], Ward [2002], and Kootnz [2003]) will be used to inform model development for later parts of the study.

Table 3-1. Packer Fed, Forward Contract, and Marketing Agreement Cattle as a Percentage of Steer and Heifer Slaughter for the Four Largest Packers

The total percentage of steer and heifer slaughter under these types of arrangements for the four largest packers has increased steadily over time, but packer-fed and forward contract cattle declined from 2001 to 2002.

	Packer Fed and Other ^a	Forward Contracts	Marketing Agreements	Total
1999	8.5	3.3	20.7	32.4
2000	9.1	2.0	27.1	38.2
2001	10.9	2.5	29.5	43.0
2002	9.6	2.4	32.4	44.4

^aOther includes steers and heifers purchased more than 14 days prior to slaughter and not listed in the other categories.

Source: U.S. Department of Agriculture, Grain Inspection, Packers and Stockyards Administration. 2004b. "Packers and Stockyards Statistical Report: 2002 Reporting Year." SR-04-01. Washington, DC, September.

One common element of each form of captive supply is that packers have some portion of their desired slaughter volume purchased 2 or more weeks in advance of the livestock being slaughtered. These marketing arrangement purchases enable packers to coordinate captive supply deliveries with cash market purchases and deliveries.

While the empirical research, on balance, suggests an inverse relationship between captive supplies and cash-market prices, establishing a causal link has been elusive.

Widespread concerns over whether the use of captive supplies affects cattle prices culminated in proposed legislation designed to ban packer ownership of cattle. While the empirical research, on balance, suggests an inverse relationship between captive supplies and cash-market prices, establishing a causal link has been elusive (Xia and Sexton, 2004). This is because, as Ward, Koontz, and Schroeder (1998) note, removing a share of cattle from the cash market affects both supply and demand in the cash market. In a competitive market, the effect on price is ambiguous because it depends on the relative magnitudes of the shifts, which is related to the functional forms of demand and supply. However, the competitive market assumption may not be appropriate given the level of concentration.

Research on the issue of captive supplies generally estimates transaction or aggregate market prices as a function of market conditions and the extent of captive supplies. Econometric tools are used where the focus of these models is on the relationship between price and captive supplies. Elam (1992) estimated the effect that variations in the volume of captive supplies had on monthly average fed-cattle prices in the United States and in

individual states, such as Texas, Kansas, Colorado, and Nebraska. Variations in captive supply deliveries were related to fed-cattle prices over the period between October 1988 and May 1991. For each 10,000 cattle delivered under captive supply arrangements, the U.S. price declined \$0.03 to \$0.09 per hundredweight (cwt). This volume of cattle is approximately a 10 percent change in the contract levels. The results from individual state prices ranged from an insignificant impact to a negative impact of \$0.37 per cwt.

Results of research by Schroeder et al. (1993) found a significant positive relationship between number of bids and prices paid by packers.

Schroeder et al. (1993) examined fed-cattle transaction data from feedlots in southwestern Kansas during May to November 1990 and modeled the relationship between variations in forward contracting volume and transaction prices for fed cattle. The volume of marketing-agreement cattle was included in the measure of captive supplies. Two measures of forward contracts were used. The first was contract deliveries as a percentage of the weekly total. The second was each meat packer's share of contract deliveries for each week. A negative relationship was found between forward contracting and fed-cattle prices. The impact ranged from \$0.15 to \$0.31 per cwt over the 6-month data period. Impacts were also examined for 2-month subsamples and for individual packers. Price impacts were not significant for some periods and some packers. This research also found a significant positive relationship between number of bids and prices paid by packers. Average prices paid by different packers were significantly different over the sample period.

Ward, Koontz, and Schroeder (1996, 1998) presented results from an extensive and comprehensive study that analyzed price impacts from captive supplies. The data were made available through congressional mandate of a study on meatpacking concentration. Transactions were collected from the 43 largest steer and heifer slaughtering plants, which were owned by 25 firms, for the 1-year period April 1992 to April 1993. The impacts of captive supplies on price were estimated with a variety of approaches. The interdependent nature of delivering cattle from three types of captive inventories and purchasing fed cattle in the cash market were examined: packer-owned cattle, marketing-agreement cattle, and forward-contracted cattle.

Results of research by Ward, Koontz, and Schroeder (1996, 1998) found that increasing deliveries of cattle from two of the three types of captive supply inventories were associated with lower transaction prices for fed cattle.

First, the impact on transaction prices was modeled as a function of the size of captive supply inventories from which future deliveries could be made. The results suggested that increasing deliveries of cattle from two of the three types of captive supply inventories were associated with lower transaction prices for fed cattle. A 1 percent increase in captive supply deliveries was associated with a \$0.05 per cwt decline in fed-cattle transaction prices for forward-contracted cattle and a \$0.36 per cwt decline for marketing-agreement cattle. There was no impact on the packer-owned cattle. Simultaneity was found between cash market transaction prices and percentage deliveries of forward-contracted and marketing-agreement cattle. This implies that packers deliver low-priced cattle.

Second, individual captive supply inventory variables had mixed impacts, while the impact of total captive supplies was not significant. A 1,000-head increase in the size of captive supply inventory was associated with

- a \$0.01 per cwt increase in transaction prices for the forward-contract inventory,
- a \$0.18 per cwt decline for the packer-fed inventory, and
- a \$0.02 per cwt decline for marketing-agreement inventory.

Ward, Koontz, and Schroeder (1996, 1998) found a positive and significant relationship between plant utilization and prices paid by packers, though the magnitude was small.

Ward, Koontz, and Schroeder (1996, 1998) found a positive and significant relationship between plant utilization and prices paid by packers, though the magnitude was small. Significant price differences were found among plants and firms. Plants paying the highest prices tended to be larger or located close to the primary cattle-feeding area of Texas, Oklahoma, Kansas, Colorado, and Nebraska.

Research by Shroeter and Azzam (1999) found packers expecting relatively large deliveries of captive supply cattle paid lower prices in the cash market.

Schroeter and Azzam (1999) used data similar to that of Ward, Koontz, and Schroeder (1996, 1998) to examine the price and captive supplies relationship. Schroeter and Azzam (1999) had access to transaction data from four plants in the Texas Panhandle region. However, the sample period is more recent—February 1995 to May 1996. The results suggest that packers expecting relatively large deliveries of captive supply cattle paid lower prices in the cash market. However, the magnitude was small. A 10 percent increase in captive deliveries is correlated with a \$0.02 to \$0.04 per cwt lower price. Schroeter and Azzam explained that the finding is consistent across studies and

cautioned that the negative relationship is not necessarily causal in nature, nor is it an indicator of noncompetitive behavior by packers.

In addition, as in previous studies, the results indicate that packing plants paid significantly different prices for fed cattle. Higher prices were found for fed cattle purchased under a marketing agreement than fed cattle purchased in the cash market. Contrary to other studies, the results suggest that one plant paid higher prices for fed cattle purchased by forward contract. However, market conditions in these short-time-period studies may have had important effects on the obtained results.

Empirical work has not provided an explanation for the differences in prices paid between the cash market, forward contracts, marketing agreements, and packer-fed cattle.

Empirical work has not provided an explanation for the differences in prices paid between the cash market, forward contracts, marketing agreements, and packer-fed cattle. The focus of most previous research is the exercise of market power. This might raise the question about why a feeder would sell in an alternative market for less when the cash price is higher. The most likely explanation relates to risk reduction both for the producer and for potential lenders, but previous research does not directly answer this question. Survey work, reviewed and cited later, asked about reasons for choices among these alternatives, but to date there have been no definitive tests of alternative hypotheses.

Azzam's model suggests that price effects depend on a complex combination of several variables, among them the respective fraction of cash-market and captive procurement supplies, and that noncompetitive conduct is not a necessary condition for a negative relationship between cash prices and captive supplies.

Earlier empirical work estimating price effects from captive supplies lacked a theoretical framework identifying the incentives for meatpacking firms to contract cattle supplies. Later work has addressed this issue. Azzam (1996) developed a conceptual framework identifying a monopsony incentive for integration by meat packers to capture fed-cattle supplies. The resulting empirical model was estimated with aggregate quarterly data for 1978 through 1993. The model provides evidence that supports the monopsony incentive.

Azzam (1998a) further developed a conceptual model for estimating the price effects from captive supplies without incorporating a backward integration motive. The model suggests that price effects depend on a complex combination of several variables, among them the respective fraction of cash-market and captive procurement supplies, and that noncompetitive conduct is not a necessary condition for a negative relationship between cash prices and captive supplies.

Thus, this research suggests that the inverse relationship between fed-cattle prices and captive supplies is not all due to noncompetitive behavior.

Love and Burton (1999) developed a strategic rationale for backward integration by packers into livestock ownership. The model included various forms of captive supplies or backward integration. Two sources of gains were identified: a dominant firm benefits from efficiency gains associated with expanded production, and the integrating firm pays a lower price for captive-supply purchases. The model results are consistent with previous empirical research. For example, other work found that

- meat packers paid lower prices for marketing-agreement cattle than cash-market cattle (Ward, Koontz, and Schroeder, 1996, 1998; Williams et al., 1996);
- higher rates of capacity utilization were associated with higher fed-cattle prices paid (Ward, Koontz, and Schroeder, 1996, 1998);
- higher rates of capacity utilization were associated with higher rates of captive-supply usage (Barkley and Schroeder, 1996); and
- large meatpacking plants paid higher prices than small plants (Ward, Koontz, and Schroeder, 1996, 1998; Williams et al., 1996).

Love and Burton's model suggests that use of captive supplies can be a potential source of market power. However, the exercise of market power might not be the prime motive for vertical integration.

Love and Burton's model suggests that use of captive supplies can be a potential source of market power. However, the exercise of market power might not be the prime motive for vertical integration as discussed below.

Zhang and Sexton (2000) developed a spatial model to illustrate how meat packers can use captive supplies strategically to influence cash market prices. The model results are due to the importance of transactions costs. As transactions costs increase, the more likely meatpacking plants will create a geographic buffer between them that reduces competition in the cash market. Schroeter and Azzam examined the Texas Panhandle data to see if conditions matched those predicted by the Zhang and Sexton model. Two predictions implied from the Zhang and Sexton model were not verified by the Texas data; specifically, they did not find that fed cattle procured by noncash-market methods were shipped farther than those procured in the cash market and that packers did not compete

in their rivals' cash-market territory. However, the geographic regions in the Schroeter and Azzam (1999) data may be too limited to test these hypotheses adequately.

Another hypothesis embedded in empirical work and not satisfactorily answered has to do with packers making rational choices among alternative sources of cattle. Captive supplies can be used as an alternative to cash markets when contract prices for cattle in the alternative market are lower. For example, in periods when prices are increasing, packers may source cattle from alternative arrangements, assuming the alternatives are priced prior to the rising market or use lagged prices as a basis. Likewise, in periods when prices are decreasing, packers will procure more cattle from the cash market. This behavior is not necessarily tantamount to exercising market power. Better understanding of this behavior requires modeling the dynamic process, which has not been possible in previous studies using transactions data. This is because the transactions data used tend to describe a very short-run market, and the behavior described above is more intermediate to long run in nature.

3.2.2 Reasons for Use and Impacts of Marketing Arrangements

Proponents of alternative marketing arrangements or "captive supplies" claim substantial benefits from their use. Critics, on the other hand, raise concerns that captive supplies have had an adverse impact on cattle producers. This section presents an overview of the literature describing the reasons marketing and procurement methods for fed cattle are changing. Particular focus is given to the benefits that accrue to participants that use alternative marketing arrangements.

Both parties to a captive-supply arrangement must decide at the time a deal is initiated that they will reap positive rewards.

Both parties to a captive-supply arrangement must decide at the time a deal is initiated that they will reap positive rewards. However, what benefits an individual seller may not benefit the industry as a whole. For example, as the use of captive supplies increases, packer monopsony power may increase. Table 3-2 summarizes the potential benefits to producers, cattle feeders, and beef packers to enter into these arrangements. Primary benefits to producers and cattle feeders include improved price risk management, improved access to financing, a guaranteed buyer, increased quality premiums, improved information, and reduced marketing costs. For packers, the key benefits include securing fed-cattle requirements so plants can operate at the

Table 3-2. Summary of Benefits for Using Alternative Marketing Arrangements in the Beef Industry

Different methods of captive supply might benefit beef producers, cattle feeders, and meat packers.

Method of Captive Supply	Producer or Cattle-Feeder Benefits	Meat Packer Benefits
Forward contract	Reduce price risk if cattle are hedged or flat priced	Secure slaughter needs
	Obtain favorable financing	Secure quality cattle
	Ensure a buyer for cattle	Reduce procurement costs
	Reduce marketing cost	Reduce price risk
Marketing agreements	Receive premiums for some cattle quality characteristics	Increase cattle quality control
	Obtain carcass information	Secure slaughter needs
	Ensure a buyer for cattle	Reduce procurement costs
	Reduce marketing costs	
Packer-owned feeding	Increase feedlot utilization	Secure slaughter needs
	Improve packer-to-feedlot relationship	Increase cattle/beef quality control

Source: Ward, C.E. 2001b. "Packer Concentration and Captive Supplies." Extension Facts F-554. Stillwater, OK: Oklahoma Cooperative Extension Service, Oklahoma State University.

highest possible levels of capacity utilization, having more control over the type and quality of cattle, and reducing procurement costs.

The literature suggests that captive supplies can improve efficiency in the overall beef supply chain by improving price signals, reducing price risk, and improving production and procurement efficiencies. In other words, the research discussed below shows there are significant motivations for producers, cattle feeders, and beef packers to use alternative marketing arrangements.

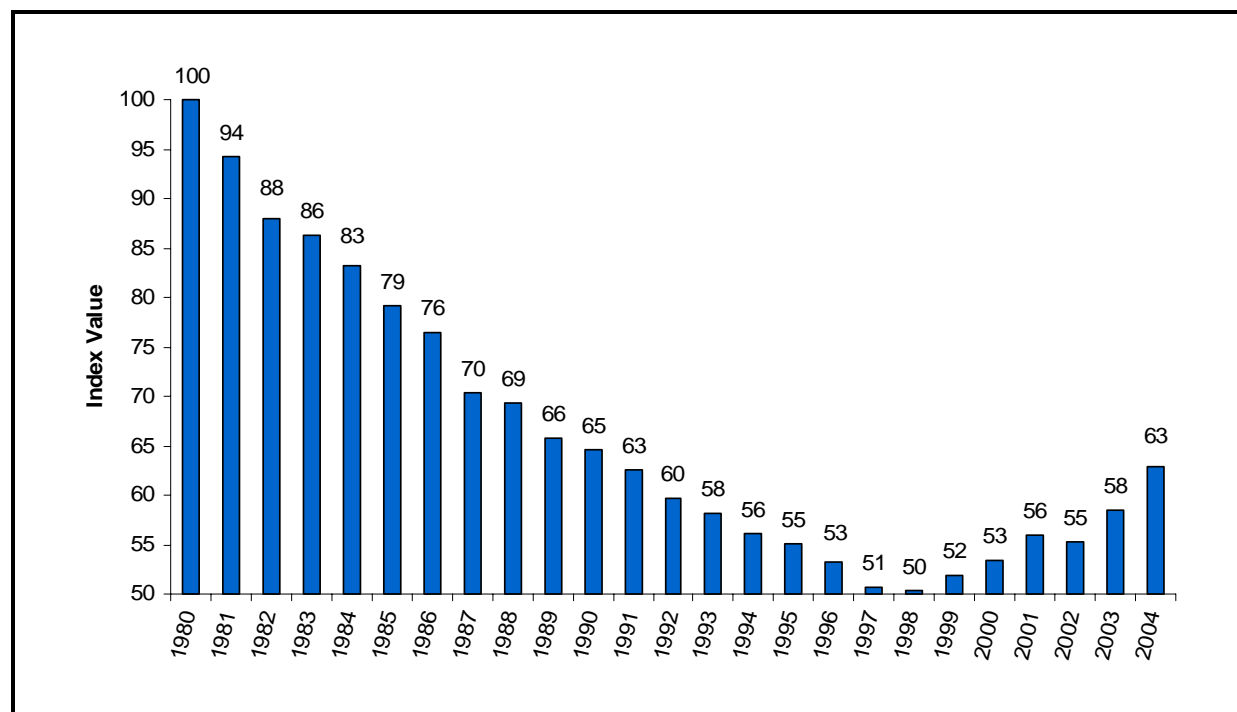
The Market for Beef

Schroeder (2000) suggests that to comprehend why the evolution in fed-cattle marketing methods is occurring requires an understanding of the economic conditions that are influencing this change. Figure 3-1 shows that the past 25 years have been difficult for the beef industry, particularly prior to the late 1990s.⁶ If beef prices had been held constant in

⁶The index presented in Figure 3-1 is constructed in Purcell (1998).

Figure 3-1. Retail Beef Demand Index (1980 = 100)

The retail beef index calculation assumes the retail price for beef remained at its 1980 level.



Source: Research Institute on Livestock Pricing. 2005. "Beef and Pork Demand Indexes."
<http://www.aaec.vt.edu/rilp/Index-Beef%20Demand%20Yearly.htm>. Accessed May 2005.

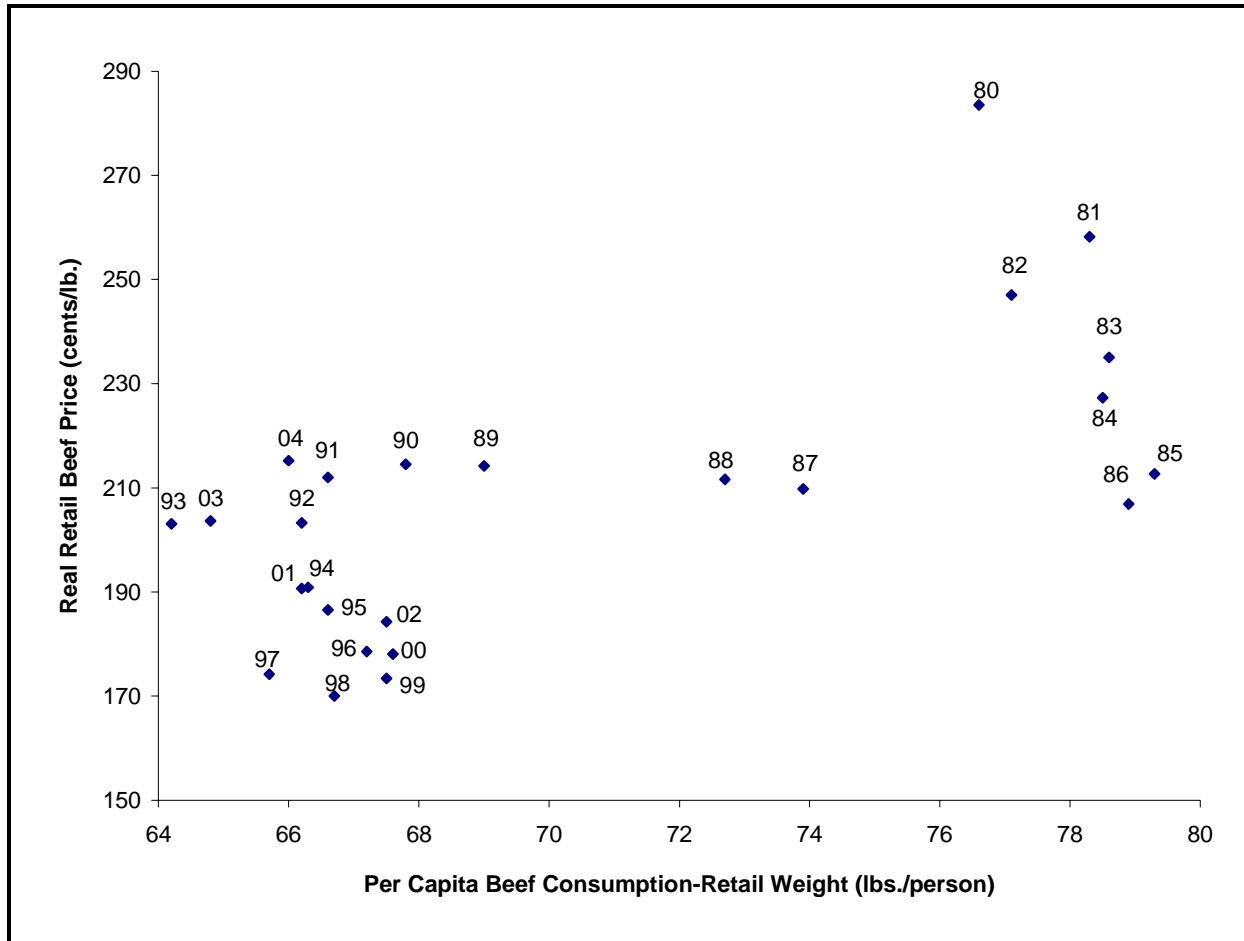
1980 dollars, beef consumption in 1998 could have been nearly 50 percent lower compared to 1980. For per capita consumption to remain relatively constant over this time frame, real beef prices had to decline almost 30 percent (Figure 3-2). Because the demand for fed cattle is derived from the demand for beef at retail, fed-cattle demand also has been affected, which, in turn has resulted in lower slaughter-cattle prices.

Pricing fed cattle on a liveweight or dressed-weight basis, where all cattle in a pen receive the same price, does not provide cattle producers with the incentive to produce the kind of cattle beef packers and consumers want.

Many industry observers have attributed the decline in beef demand over the past 2 decades to a variety of factors, including poor and inconsistent beef quality, changing consumer demographics and preferences, changes in prices for substitute products, health and nutrition concerns, food safety concerns, and lack of innovative product development. Schroeder (2000) states that the failure of the industry to produce products that the consumer wanted was due to a lack of vertical coordination in the supply chain. Producers were not provided adequate pricing signals to produce the kinds of products consumers wanted. Pricing fed cattle on a liveweight

Figure 3-2. Annual Inflation-Adjusted Beef Price—Per Capita Quantity Relationships, 1980–2004

Per capita beef consumption remained flat, while retail beef prices declined in the 1990s.



Source: Research Institute on Livestock Pricing. 2005. "Beef and Pork Demand Indexes."
<<http://www.aeec.vt.edu/rilp/Index-Beef%20Demand%20Yearly.htm>>. Accessed May 2005.

or dressed-weight basis, where all cattle in a pen receive the same price, does not provide cattle producers with the incentive to produce the kind of cattle beef packers and consumers want (Schroeder, 2000).

Price Signals

Inefficient coordination increases costs and results in greater risk for beef industry participants.

In modern market economies, price signals have traditionally been used to coordinate economic activity. Price signals originate with consumers and are passed along the supply chain until they reach producers. Collins (1959) recognized that the price system can be an inadequate means of coordinating activities at various stages of production. He argued that prices may not provide clear enough signals when decisions made at one stage of production affect the performance of successive

stages. This problem is particularly true of the beef industry because prices fail to transmit detailed information about consumer demands for more specialized food items. Inefficient coordination increases costs and results in greater risk for beef industry participants. This means the effect of inefficient coordination is to reduce the competitiveness of the beef industry compared with the more vertically coordinated pork and poultry industries.

Research by Schroeder and Graff (2000) indicates

- grid pricing is more discriminating in terms of pricing signals provided to producers and
- high-quality cattle “subsidize” low-quality cattle by about \$30 to \$40 per head.

Average liveweight and dressed-weight prices illustrate the problem of inadequate price signals. Schroeder and Graff (2000) compared prices for individual fed cattle using liveweight, dressed-weight, and grid pricing. They found that grid pricing resulted in twice as much variability in prices received per hundredweight across carcasses as compared with liveweight or dressed-weight pricing. These results suggest that grid pricing is more discriminating in terms of pricing signals provided to producers. Their results also indicated that high-quality cattle “subsidize” low-quality cattle by about \$30 to \$40 per head.

Risk Management

Research conducted by Fausti and Feuz (1995) examined packer purchasing behavior from a risk-management perspective. They found that when a firm is facing uncertainty, in the absence of market failure, purchasing under alternative pricing structures generates price disparity. A firm will pay less for an input with uncertainty over its “total product” in a market than it will pay for an input when its contribution to production is known. The implication is that the mere presence of uncertainty generates price disparity between marketing alternatives for fed cattle. Further, if one assumes that buyers are risk adverse, then as the uncertainty over an input’s contribution increases, the price paid for the input declines. This implies that the price disparity between alternatives increases as sellers move from marketing their cattle on both dressed weight and grade, to dressed weight only, and then to liveweight.

Forward contracts that establish price reduce price risk for both cattle feeders and beef packers.

Forward contracts that establish price reduce price risk for both cattle feeders and beef packers. Contracts also enable cattle feeders to obtain more favorable financing terms. Having a buyer identified in advance assures cattle feeders of a timely market outlet. Feedlots have about a 2-week market window

over which they can most effectively market fed cattle. During this time frame with steady market prices and typical quality and yield discounts, profits tend not to change by more than \$1 per head. Selling cattle 1 week prior to this period reduces profit by an estimated \$6 per head and 1 week after by an estimated \$2 per head. Therefore, this risk is reduced if a contract is in place (Schroeder, 2000).

3.2.3 Producer and Packer Motivations for Use of Alternative Marketing Arrangements

As described above, Ward (1999) discussed the incentives for cattle feeders and for meat packers to enter into captive supply agreements, including forward contracts, marketing agreements, and packer-owned feeding. Both cattle feeders and meat packers may benefit. However, Ward noted concerns regarding captive supplies, such as lack of and reduced public market information about cattle transactions, reduced competition for fed cattle, and increased market power of packers holding cattle in captive supply.

Similar to Ward's findings, respondents to a survey of cattle feeders in Iowa, Kansas, Nebraska, and Texas rated as highest the following reasons for entering into marketing agreements:

- allows them to obtain quality and yield grade premiums for cattle
- allows them to obtain detailed carcass data for cattle sold
- guarantees a buyer for cattle
- reduces marketing time and costs (Schroeder et al., 2002)

The authors noted that most empirical research has indeed found an economically small, but statistically significant, negative correlation between captive supply and short-run cash fed-cattle prices.

The survey respondents use a variety of pricing methods, including cash-market prices based on liveweight or carcass weight, grid pricing with different methods of establishing a base price, and contract pricing (Schroeder et al., 2002). Respondents generally believed that cash-market bids by packers are lower when packers obtain cattle through contracts. The authors noted that most empirical research has indeed found an economically small, but statistically significant, negative correlation between captive supply and short-run cash fed-cattle prices.

Survey results presented in Hayenga et al. (2000) indicate that the two most important reasons for packers entering into forward contracts and marketing agreements with cattle producers are to

- secure higher-quality cattle and
- secure more consistent quality cattle.

A survey of the 15 largest U.S. beef packers focusing on procurement and beef marketing practices (Hayenga et al., 2000) provides information regarding producer and packer motivations for using alternative purchasing arrangements. This study found that for packers the two most important reasons for entering into forward contracts and marketing agreements with cattle producers were to “secure higher-quality cattle” and “to secure more consistent quality cattle.” Packers also expected these motivations to be the same or greater in the future. Improving risk management, reducing plant operating costs by improving slaughter plant capacity utilization, and assuring food safety were the next most important reasons. Packers attached little importance to obtaining a lower price, which may be because contracts and agreements do not enable packers to pay a lower price for fed cattle. Findings from this survey indicate that the primary factors motivating beef packer use of alternative marketing arrangements is obtaining the quality and quantity of cattle desired.

Packers perceived that the primary incentive of producers to enter into alternative marketing arrangements was to use a quality premium/discount grid, followed by enabling producers to obtain a higher price for fed cattle. Packers believed that, over the next 5 years, producers would also benefit because use of a premium/discount grid would enable producers to obtain detailed carcass quality data. The responses to a survey conducted by Schroeder et al. (2002) were consistent with the survey results discussed above. The primary reasons for using grid pricing were to obtain quality and yield grade premiums and to obtain detailed carcass data. However, some producers expressed concerns about using grid pricing for fed cattle. These concerns are related primarily to methods used to establish base prices, whether packers manipulate base prices, the structure of grid premiums and discounts, and techniques used to measure carcass quality (Schroeder et al.).

Securing cattle well in advance of slaughter reduces the risk of not being able to secure adequate quantities of cattle needed to operate plants at high levels of efficiency. Packing plants have a relatively high ratio of fixed-to-variable costs, which means that marginal and average costs fall as capacity utilization increases. This means that to minimize costs, packers have strong incentives to operate plants near capacity (Koontz and Purcell, 1997). This is consistent with Hayenga’s survey results that

Securing cattle well in advance of slaughter reduces the risk of not being able to secure adequate quantities of cattle needed to operate plants at high levels of efficiency.

indicate that one of the most important reasons for using futures contracts and marketing agreements was to improve capacity utilization. In an earlier study, Barkley and Schroeder (1996) found that larger beef packers use captive supplies to help keep plant utilization high.

Schroeder (2000) explained that packers realize significant cost savings by operating plants near design capacity. Based on work by Anderson and Trapp (1999), he reported that the estimated value of increasing operating capacity from 70 to 90 percent reduced plant killing and fabrication costs \$16.20 per head.

3.2.4 Role of Alliances in the Beef Industry

To build market share the beef industry is developing products that are responsive to consumers through branded beef programs and other types of alliances.

Traditionally, consumers have not chosen beef on the basis of brand-differentiated quality characteristics. Rather, beef has been marketed as generic meat cuts. However, to build market share the beef industry is developing products that are responsive to consumers through branded beef programs and other types of alliances.⁷ Branded beef programs are emerging as a response to changing consumer demands. These programs emphasize different product attributes—such as breed, production methods, health, and eating quality—and are generally sold under premium brands, which are positioned at a higher-quality level than unbranded products. Existing grading systems are not able to classify and identify all of the beef attributes included in the branded programs.

Improving beef product quality relies critically on market prices conveying appropriate information about characteristics that consumers desire.

It is widely recognized by most industry participants that the U.S. grading system does not identify adequate measures of eating quality. Surveys of beef purveyors, packers, restaurateurs, and retailers in the 1995 National Beef Quality Audit (Smith et al., 1995) identified the top-five beef controllable concerns regarding the quality of beef in terms of value as consistency, tenderness, palatability, excessive external fat, and high prices relative to value. Yet improving beef product quality relies critically on market prices conveying appropriate information about characteristics that consumers desire. Jones et al. (1992) found that wholesale beef value differentials were not fully reflected in live-cattle prices. This

⁷Alliances refer to relationships formed by two or more industry participants to meet common production or marketing objectives and to improve information flow.

finding is consistent with what has been called pricing cattle on the averages, which inhibits communication of consumer demand to producers via market prices (Schroeder et al., 1998). Contracts and alliances are a response to this failure of the price system.

From a supply perspective, branded programs necessitate a new type of relationship with suppliers. Direct relationships must be established with groups of producers that require specific production requirements. Branded programs enable retailers to become more involved than previously in the supplier's production process. Further, even though buyers may have recourse to wholesale markets for the supply of standard products, premium branded products are based on long-term contractual supply relationships. Commitment is especially important when the goal of a program is to provide a product with many detailed specifications or attributes that cannot easily be identified or assured along the supply chain (Brocklebank and Hobbs, 2004).

The willingness of consumers to pay a premium is critical to the ability of branded products to improve the profitability of retailers and other industry participants. This is especially important given that branding often involves additional costs associated with production and risks of entering into supply chain relationships with a limited number of buyers. Several studies found that consumers are willing to pay a premium for special attributes. For example, in an experimental study conducted in a grocery store setting, Lusk et al. (2001) found that consumers were willing to pay a premium of \$2.67 per pound for steak that was "guaranteed tender." The question is whether these premiums are sufficient to cover the costs of producing the differentiated products.

Clearly, a variety of industry participants are betting that consumers are willing to pay a premium for "guaranteed tender." The March 2005 issue of *Drovers* identified 54 vertical relationships or alliances, 34 of which required source verification, 17 were listed as natural, 27 had preconditioning requirements, and 22 had weaning requirements. Just a few years ago, the number of cattle marketed through such programs represented only a fraction of the nation's total. Today, with more than 300 convenient beef products that have reached the market, analysts estimate that 25 percent of the

Today, with more than 300 convenient beef products that have reached the market, analysts estimate that 25 percent of the cattle will be marketed through some form of vertical relationship this year and rapid growth is projected for the next several years.

cattle will be marketed through some form of vertical relationship this year and rapid growth is projected for the next several years (Drovers, <http://www.drovers.com/directories.asp?pgID=648>).

In 2001, feedlots in Iowa, Kansas, Nebraska, and Texas were surveyed to examine the changes in marketing methods for fed cattle. The results of the survey indicated that the percentage of fed cattle sold under contracts and alliances had changed significantly, from 23 percent in 1996 to 52 percent in 2001. Correspondingly, producer participation in alliances also increased (Schroeder et al., 2002).

In the United States, a myriad of coordinating mechanisms govern the production of branded products, including contracts, alliances, and cooperative arrangements. There is no single format to develop a particular branded beef program. One commonality among nearly all beef alliances is the use of pricing grids that are designed to provide incentives to produce animals that will yield desired carcass traits (Anton, 2002).

Methods of vertical coordination vary significantly and often depends on which supply chain member initiates the program and which attributes are being guaranteed. Currently, three dominant supply chain structures can be identified (Schroeder and Kovanda, 2003; Anton, 2002; Brocklebank and Hobbs, 2004):⁸

- brand licensing programs
- marketing alliances
- new-generation cooperatives

Brand licensing programs are generally breed based (e.g., Certified Angus Beef, Certified Hereford Beef), although they need not be. These programs require cattle to meet a certain genetic “template,” thereby creating value by centering the program around a branded product that uses breed to convey a certain level of quality. Licensing programs tend to be loosely

⁸Brocklebank and Hobbs (2004) also considered externally coordinated branded beef programs, such as the now bankrupt Future Beef Operations, as an alternative alliance structure. This alliance was driven by a newly formed corporation instead of an existing supply chain participant that attempted to coordinate cow-calf producers, feedlots, packers/processors, and retailers.

coordinated, with the only obligation being the certification of participants (Anton, 2002).

Marketing alliances are programs initiated by processors and retailers. These programs are owned by operations that purchase finished cattle from cow-calf producers and/or feedlots using a quality-based grid that typically has quality, yield, and process requirements. Value is added by creating brand identification for niche products (such as Nolan Ryan's or Laura's Lean).

New generation cooperatives, such as Ranchers Renaissance or U.S. Premium Beef, typically limit membership, impose strict quality and delivery standards, and require a fairly substantial up-front investment. The structure is more formal than the vertical arrangements discussed above. Shares establish a two-way contract between the members and the cooperative, which requires members to sell a certain number of cattle through the cooperative and that the cooperative take delivery of these cattle. A grid-pricing system is generally used, thus providing members with a further incentive to comply with product specifications. In addition to premiums, dividends may be paid to members (Brocklebank and Hobbs, 2004).

3.3 EMPIRICAL LITERATURE ON MARKETING ARRANGEMENTS IN THE HOG AND PORK INDUSTRIES

This section summarizes the literature on use of marketing arrangements in the hog and pork industries. Annual surveys on use of marketing arrangements are conducted for the pork industry and thus provide useful background information in addition to other sources.

3.3.1 Types of Spot and Alternative Marketing Arrangements Used in the Hog and Pork Industries

Spot Market for Hogs

A market can be defined in terms of a particular geographic location (a place) where a commodity is traded or exchanged in an agreement between a buyer and seller. Marketing or marketing arrangements can be defined as all activities involved in the sale of a commodity from the producer to the consumer. In general, transactions in the livestock industry can be classified as being either negotiated market (spot)

A marketing agreement can be a written or verbal agreement that establishes an ongoing relationship with respect to purchases beyond the window of a negotiated single-lot transaction for immediate delivery.

transactions or nonnegotiated (nonspot) market transactions, meaning that some alternative marketing arrangement other than a negotiated market transaction is being employed.

A negotiated (spot) market arrangement involves the trading of commodity that is sold and delivered immediately to the buyer.⁹ Nonnegotiated or alternative arrangements, such as marketing agreements, involve the trading of commodity that is being bought and sold in an arrangement departing from either being strictly a negotiated transaction, for immediate delivery, or both. That is, a marketing agreement can be a written or verbal agreement that establishes an ongoing relationship with respect to purchases beyond the window of a negotiated single-lot transaction for immediate delivery. An example of a nonnegotiated transaction is a ledger account. If a hog producer has a ledger account and the specified price is less than the market, the difference between the specified price and the market price would be credited to the packer's ledger, showing a credit to the producer and with the producer only receiving the lesser specified price in negotiated payment. An example of a nonimmediate delivery is when a producer enters into a forward contract to deliver a specified number of head at some future date outside a 2-week window from the date the agreement is made, such as 6 months ahead from when the agreement is made.

Each of the alternative marketing-arrangement categories has various forms, as described in Section 4. The negotiated (spot) market transactions category takes the form of a direct trade, auction barns, video or electronic auctions, and dealers or brokers. These various forms all have the commonality of the seller providing the commodity, the buyer paying cash, and the commodity being delivered immediately. These forms of transactions, specifically the direct trade and auctions, are the more traditional and most seasoned forms of marketing arrangements. Alternative marketing arrangements entail a host of various arrangements, including forward contracts, marketing agreements, internal transfers, production contracts, and custom feeding and backgrounding. These alternative marketing arrangements can be short-term arrangements that

⁹The terms "negotiated," "spot," or "cash market" are often used interchangeably in the literature.

This industrialization involves changes in the way livestock are produced with technological innovations, consolidation and larger-scale production, and significant use of production contracts.

The industry is restructuring to provide consistently high-quality food products demanded by the consumer and at the same time reducing costs using technology and economics of size.

might be binding over a 12-month period or some may be longer-term arrangements that are binding for multiple years. In addition, these alternative arrangements involve some terms of the sale, such as price or delivery date being established beyond a 2-week window when the agreement is made.

The livestock industry across species has seen a substantial transformation in structure and use of marketing arrangements in just the past decade. Urban (1991) coined the term “industrialization of agriculture” for this transformation. Rhodes (1995) discussed in detail and addressed the question of what is industrialized hog production. This industrialization involves changes in the way livestock are produced with technological innovations, consolidation and larger-scale production, and significant use of production contracts. It also involves changes in procurement, with an increased amount of livestock now being purchased under a formal marketing agreement. Schroeder, Mintert, and Berg (2004) attributed new technology, size economics, and the need to provide consumers consistent meat products at competitive prices as motivators for this structural change.

USDA-AMS (2005) reported that from the slaughter perspective, currently four firms slaughter about 80 percent of fed cattle, about 55 percent of all hogs, and about 80 percent of all lambs. The livestock industry is also becoming more concentrated at the producer level; USDA-AMS (2005) reported that 105 feedlots account for about 39 percent of feedlot cattle marketings and that about 2,000 operations control about 47 percent of hog inventory. Hurt (1994) pointed out that of the 434,000 farms that have left the hog industry since 1980, about 85 percent had fewer than 100 hogs in inventory. Barkema, Drabentstott, and Novack (2001) attributed the consolidation in the U.S. meat industry to two primary drivers—food demand and technology. That is, the industry is restructuring to provide consistently high-quality food products demanded by the consumer and at the same time reducing costs using technology and economics of size. Barkema, Drabentstott, and Novack concluded the result is a more efficient industry but with fewer and larger retailers, processors, and farms.

This transformation and departure from negotiated (spot) market sales to alternative marketing arrangements, which are becoming increasingly more sophisticated and less transparent, has made quantifying the underlying production and marketing characteristics in place a challenging task.

Methods of trading livestock have changed dramatically over time. Specifically, it has been well documented that in the past decade substantially fewer livestock are being traded using negotiated (spot) market transactions, and marketing contracts are being increasingly employed, a phenomenon that continues to develop (Grimes and Plain, 2005; Grimes, Plain, and Meyer, 2003, 2004). This transformation and departure from negotiated (spot) market sales to alternative marketing arrangements, which are becoming increasingly more sophisticated and less transparent, has made quantifying the underlying production and marketing characteristics in place a challenging task. The difficulty stems from the fact that the alternative marketing arrangements are continuously evolving, as are the definitions of marketing arrangements used in surveys and the literature.

This is especially pertinent for the hog industry. The series of U.S. Hog Market Contract Studies published in 2003, 2004, and 2005 (see Grimes and Plain [2005]; Grimes, Plain, and Meyer [2003, 2004]) are careful to note in each study that the definition of marketing arrangements is different from previous years and that even some of the mandatory price definitions have changed. Thus, measuring and quantifying the use of different marketing arrangements is made difficult by marketing arrangements that are in a perpetual state of flux.

There is a growing literature and great interest in the fundamental question of what the livestock industry looks like with respect to marketing characteristics, what is responsible for driving changes, and what it might look like in the future. Underlying this interest in marketing characteristics is defining and understanding what appears to be the negotiated (spot) market at any given point in time. A further complicating factor is measuring and understanding the shrinking volumes that are actually being traded at this price and what this means for price discovery and the alternative forms of marketing arrangements that often use this negotiated (spot) price as a base price in the marketing contracts.

If the availability of spot markets declines, more producers might use contracts to avoid less reliable spot markets, which thus further erodes the use of spot markets.

The National Pork Producers Council (NPPC) (2000a) stated that to understand the implications of marketing contracts on market prices, it is important to understand how prices emerge. They differentiate between the concepts of “price determination” and “price discovery” and then discuss several potential impacts of marketing contracts on market prices. In the presence of contracts, fewer hogs will be available on the open market, thereby having a market-thinning effect. Given some of the inherent characteristics in the meatpacking industry—such as there only being a few buyers, short-run capacity constraints, quality differences, and high capital costs—this thinning could lead to increased volatility. They also suggested that there might be changes in the distribution of quality because one of the incentives of contracting is to secure the highest quality hogs. This, of course, detracts from the quality of the hogs remaining in the spot market. In addition, if spot markets are indeed compromised, this will ultimately affect contracts because of formula pricing. Therefore, this becomes a circular problem, with more contracts to avoid less reliable spot markets, which further erodes spot prices, which in turn further motivates additional contracts.

NPPC (2000a) also outlined potential impacts of marketing contracts on market responsiveness and the degree of market integration, arguing that if both contracting and determining or discovering spot market prices become ineffectual, an alternative would be to integrate and use an internal transfer within a vertically aligned firm.

Schroeder, Mintert, and Berg (2004) made the important point that, at first glance, the declining volume of hogs marketing via negotiated cash markets implies that cash-market sales might no longer be relevant. However, they pointed out that the negotiated cash-market price still figures prominently in pricing hogs because base-merit pricing systems use these prices by tying the base price to an external reference price (most commonly a negotiated reference price reported by the USDA). Hayenga et al. (2000) warned that with less spot-market volume, problems may arise because of limited access to markets for small producers and increased volatility for their hogs. Furthermore, they warn that this increased volatility could be a consequence of this thin market being the “shock absorber” for unanticipated changes in supply and demand. Hayenga et al. went as far as to recommend that “formula

pricing may need to include a clause that would trigger a renegotiated pricing base if spot markets get too thin” (p. 41).

The most recent U.S. Hog Marketing Contract study by Grimes and Plain (2005b), which analyzes the January 2005 data for hog marketing arrangements or marketing contracts using the mandatory price-reporting information, provides the most recent snapshot of marketing and pricing arrangements for hogs. Some of these results are reproduced in Table 3-3. During the period January 3 through January 29, 2005, the total number of hogs slaughtered under federal inspection was approximately 8 million. The mandatory price-reporting system captures 91.2 percent of this slaughter. According to Grimes and Plain, negotiated-spot purchases accounted for only 10.6 percent of the purchases of market hogs.¹⁰ That is, the once dominant category that accounted for about 62 percent of sales a decade ago (in 1994) is now approaching single digits (Grimes and Plain, 2005b). This means that nonnegotiated or nonspot purchases during this month accounted for 89.4 percent of the purchases of market hogs included in the mandatory price reporting data.

Of the nonnegotiated purchases, the most common pricing arrangement is hog or meat market-formula pricing, accounting for 39.9 percent of purchases. Importantly, although these purchases are not made in the negotiated-spot market, they are tied to this market or to meat prices in some fashion. In this sense, the negotiated-spot market plays a role as a price discovery mechanism. The next largest type of purchases was packer owned, representing 21.4 percent of purchases, followed by other purchasing arrangements (including contracts tied to feed prices), representing 15.4 percent of purchases. Finally, other market formula arrangements (including use of futures contracts) represented 10.3 percent of purchases, and packer-sold hogs represented 2.4 percent of purchases. Packer-sold hogs are hogs produced by a packer but not able to be slaughtered in one of the packer’s own plants. Insofar as January is representative of the typical breakdown of

¹⁰For consistency with Grimes and Plain (2005b), the term “negotiated-spot” is used in this discussion. Elsewhere in this report, we refer to these as spot or cash market sales.

Table 3-3. Percentage of U.S. Hogs Sold through Various Pricing Arrangements, January 1999–2005

The importance of the negotiated-spot price used for either market clearing or price discovery has diminished from approximately 80 percent to 50.5 percent of all transactions in the hog market over the previous 5 years.

Item	Pricing Arrangement	1994	1997	1999	2000	2001	2002	2003	2004	2005
[a]	Hog or meat market formula			44.2	47.2	54.0	44.5	41.4	41.4	39.9
[b]	Other market formula			3.4	8.5	5.7	11.8	5.7	7.2	10.3
[c]	Other purchases arrangement			14.4	16.9	22.8	8.6	19.2	20.6	15.4
[d]	Packer-sold						2.1	2.2	2.1	2.4
[e]	Packer-owned						16.4	18.1	17.1	21.4
[f]	Negotiated-spot ^a	62.0	43.4	35.8	25.7	17.3	16.7	13.5	11.6	10.6
[g] = sum ([a]–[f])				97.8	98.3	99.8	100.1	100.1	100.0	100.0

Source: Grimes, G., and R. Plain. January 2005b. "U.S. Hog Marketing Contract Study." Department of Agricultural Economics Working Paper No. AEWP2005-1. Ames, IA: Iowa State University.

Note: Data for 1995, 1996, and 1998 are not available.

^aTerminology is retained from the source. Elsewhere in this report, we refer to these as "cash or spot" market arrangements.

[f] + [a]	Determined by spot [lower bound]	80.0	72.9	71.3	61.2	54.9	53.0	50.5
[h] = 100-[f]	Nonnegotiated/nonspot	38.0	56.6	82.7	83.3	86.5	88.4	89.4

alternative marketing arrangements, these market shares provide a snapshot of the pricing arrangements being used.

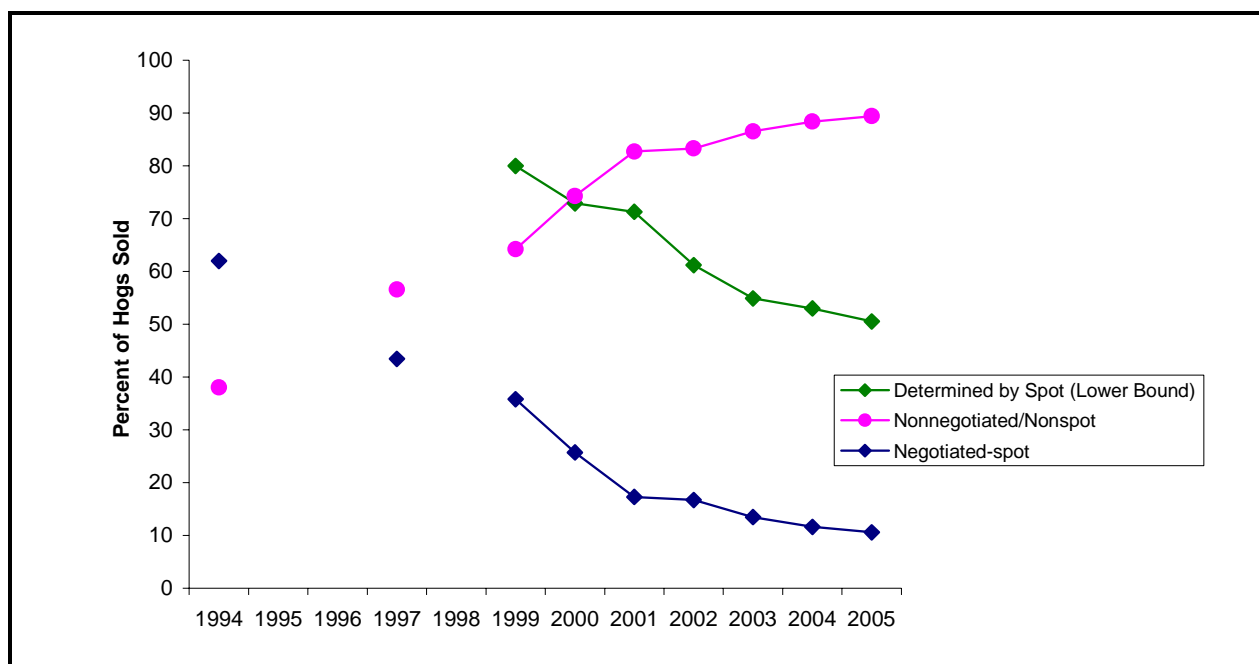
Following the logic and calculations by Grimes and Plain (2005b), one can determine a lower bound on the use of the negotiated price as either a market-clearing price for a transaction or as a price discovery mechanism. The negotiated prices ([f] in Table 3-3) plus the hog or meat market formula ([a] in Table 3-3) reveal that the importance of the negotiated price has diminished significantly in recent years. The calculation shown at the bottom of Table 3-3 reveals that in 1999 at least 80 percent of all purchases used this negotiated price, but this has declined to about 50 percent of sales in 2005.

This empirical evidence of a substantial switch in dominance of pricing arrangements in a single decade from spot to nonspot purchases is symptomatic of an industry that has been in flux and has undergone tremendous transformation.

In addition to providing an analysis of the latest hog marketing arrangements, Grimes and Plain (2005b) also included estimates from previous similar studies covering the years 1994, 1997, and 1999–2005. These estimates are also reproduced in Table 3-3. Grimes and Plain were careful to point out that direct comparisons for all marketing arrangements cannot be made across years except for the spot market or negotiated groups. With this in mind, Table 3-3 develops an estimate for the percentage of hogs priced on a nonnegotiated/nonspot basis that includes all marketings except the negotiated-spot prices. A reversal of the importance of the negotiated versus nonnegotiated purchases occurred, as negotiated-spot arrangements shrank from 62 percent in 1994 to 10.6 percent in 2005, and the nonnegotiated-nonspot arrangements increased from 38 percent to 89.4 percent. This transformation from hog purchases being predominantly negotiated transactions in 1994 to overwhelmingly nonnegotiated arrangements a decade later is illustrated in Figure 3-3. The trajectories over time show that the most rapid transformation occurred during the 3-year period from 1999 to 2001. Not surprisingly, this period coincides and follows the record low prices seen in late 1998 and 1999. This empirical evidence of a substantial switch in dominance of pricing arrangements in a single decade from spot to nonspot purchases is symptomatic of an industry that has been in flux and has undergone tremendous transformation.

Figure 3-3. Percentages of Hogs Sold by Various Arrangements 1994, 1997, 1999–2005

Hog purchases have transformed from being predominantly negotiated-spot transactions to predominantly nonnegotiated (nonspot) transactions over the past decade.



Source: Derived from Grimes, G., and R. Plain. January 2005b. "U.S. Hog Marketing Contract Study." Department of Agricultural Economics Working Paper No. AEWP2005-1. Ames, IA: Iowa State University.

Measuring, explaining, and analyzing the cause of this shrinking share of purchases in the spot market for hogs and the substantial move toward nonnegotiated purchases and what it means moving forward has generated a significant amount of attention by agricultural economists in recent years (e.g., Hayenga, Harl, and Lawrence [2000]; Lawrence, Schroeder, and Hayenga [1999]; Hennessy and Lawrence [1999]; McBride and Key [2001]; Barkema, Drabenstott, and Novack [2001]; Hayenga et al. [2000]).

Captive Supplies for Packers

GIPSA has tentatively defined captive supply as livestock owned or fed more than 14 days prior to slaughter, livestock procured by a packer through a contract or marketing agreement that has been in place for more than 14 days, or livestock otherwise committed to a packer more than 14 days prior to slaughter (USDA-GIPSA, 2002a and 2002b). Based on this definition and the survey results of Grimes and Plain (2005b)—the estimate of the percentage of negotiated-spot sales reproduced in Table 3-3—an upper-bound estimate can be derived of what could be considered captive supplies in the hog

market over time. This upper bound can be calculated by subtracting the negotiated-spot sales percentages from all pricing arrangements ($[h] = 100 - [f]$) in Table 3-3). This reveals that captive supplies in the hog industry in 2005 could be as much as 89.4 percent of all sales. This is a marked increase from 38 percent in 1994 or 64.2 percent as late as 1999.

To be clear, this estimate should be considered as an upper bound, with the actual level being potentially considerably less if the marketing and various pricing arrangements comprising categories [a] – [e] fall outside the definition of captive supplies. Figure 3-3 shows that this upper-bound estimate, labeled as nonnegotiated/nonspot, increased dramatically in 1999 (after the hog crisis) before tapering off but still increasing, albeit less dramatically, from 2002 onward.

Marketing Arrangements and Hog Operation Size

It is well documented that the hog industry is becoming more concentrated, as indicated by a recent significant decline in the number of hog farms but with stable or slightly higher inventories.

It is well documented that the hog industry is becoming more concentrated, as indicated by a recent significant decline in the number of hog farms but with stable or slightly higher inventories. Key (2004) noted that, of the major commodities, the hog sector has experienced both the greatest consolidation in production and increase in the use of contracts. Based on USDA-NASS (1995–1999b) data over the period 1995 through 1999, the number of U.S. hog farms fell by more than 50 percent (from 200,000 to fewer than 100,000), while the inventory remained relatively stable. More recent livestock and inventory statistics from a USDA-NASS online database (<http://www.nass.usda.gov:81/ipedb/hogs.htm>) reveal that the 91,190 hog operations in 1999 further consolidated to 60,830 by 2004, a 42 percent reduction of the total number of operations. Over the same period, the numbers of hogs and pigs increased by 2.2 percent—from 59.3 million head in 1999 to 60.6 million in 2004.

Another notable statistic in relation to the dramatic consolidation in the hog industry is the average number of head per operation, which has increased from 589 head per operation in 1998 to 1,023 in 2004 (a 73.7 percent increase). The peak in hog and pig numbers over the period 1990 to 2004 occurred in 1998 when inventories were 62.2 million head. This period corresponds with the hog price crisis when prices reached historical lows in late 1998 and early 1999. The timing

of the hog price crisis and significant consolidation in the industry that ensued shortly thereafter further contributed to the erosion of the use of negotiated sales. Hayenga et al. (2000) concluded that the financial crisis in pork production during 1998 and 1999 stimulated more producers to seek out contracts to stabilize their financial situation. This use of an increased number of contracts led to fewer hogs being purchased on the negotiated market. Hayenga et al. also noted that producer satisfaction with hog production and marketing contracts is high.

One measure of the impact of consolidation on marketing arrangements is the empirical evidence in the literature about what happens to choice of marketing arrangements as operations become larger. Several studies have used industrywide surveys to investigate this question (e.g., Lawrence and Grimes [2001] for 2000 and Boessen, Lawrence, and Grimes [2004] for 2003). The results of these surveys are reproduced in Table 3-4 and illustrated in Figures 3-4 and 3-5. Both surveys show a strong positive trend that as producers get larger, they tend to use more marketing contracts. Conversely, as producers become larger they tend to rely less on spot sales. However, there are some important differences in relation to the use of spot sales in 2000 versus 2003 that warrant discussion.

The 2000 survey reported that producers in the 1,000- to 2,000-head marketing group predominantly used negotiated-spot sales. For this group, approximately 77 percent of hogs were marketed using negotiated-spot sales. Producers in the 5,000- to 10,000-head marketing group tended to use about an equal mix of negotiated-spot sales (53 percent) and marketing contracts (47 percent). Producers marketing more than 50,000 head annually predominantly used marketing contracts rather than negotiated-spot sales. Notably, the largest producers marketing 500,000 or more head annually used negotiated-spot sales for 1 percent of all marketing. Based on the survey results alone, one might conclude that firm size and use of negotiated-spot sales are inversely related. It follows that with recent consolidation and increasing size of hog operations, the share of negotiated-spot market sales may diminish further.

Table 3-4. U.S. Hog Marketing Using Negotiated-Spot and Marketing Contracts, 2001 and 2004

As hog producer operations become larger, they tend to use more marketing contracts and fewer negotiated-spot sales for selling hogs.

	Number of Marketings Per Year (thousands)								Total
	1–2	1–3	2–3	3–5	5–10	10–50	50–500	500+	
Lawrence and Grimes (2001), Table 14a									
Negotiated–spot	77	—	74	58	53	40	10	1	29
Marketing contract ^a	24	—	26	42	47	60	89	99	71
Total	101	—	100	100	100	100	99	100	100
Boessen, Lawrence, and Grimes (2004), Table 20									
Negotiated–spot	—	53	—	40	29	26	11	15	22
Marketing contract ^b	—	47	—	60	68	73	90	85	77
Total	—	100	—	100	97	99	101	100	98

Note: Totals might not sum to 100 due to rounding.

^aIncludes formula spot or wholesale, fixed price tied to futures, fixed price tied to feed price, risk share (window), and other.

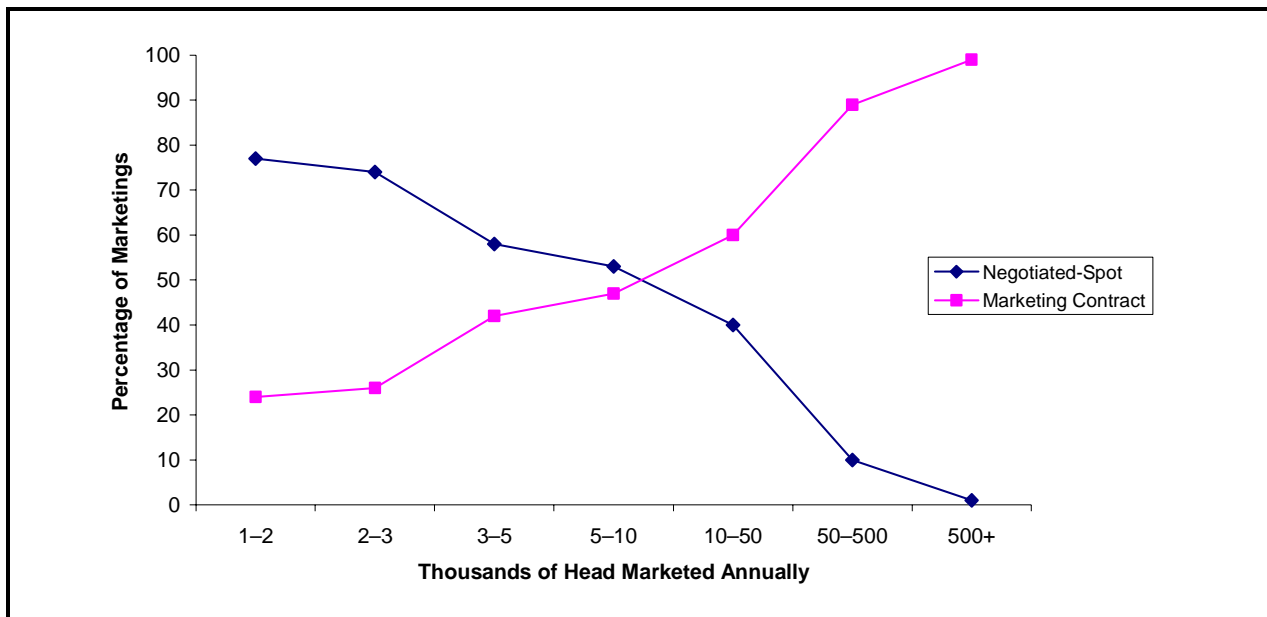
^bIncludes contract future market, formula hog prices, formula meat prices, formula feed/ledger, formula feed/no ledger, window-ledger, and window-no ledger.

Sources: Lawrence, J. D., and G. Grimes. August 2001. "Production and Marketing Characteristics of U.S. Pork Producers, 2000." Staff Paper No. 343. Ames, IA: Department of Economics, Iowa State University.

Boessen, C., J. D. Lawrence, and G. Grimes. July 2004. "Production and Marketing Characteristics of U.S. Pork Producers—2003." Department of Agricultural Economics Working Paper No. AEWP 2004-04.

Figure 3-4. Use of Negotiated-Spot Versus Marketing Contracts by Size of Hog Operation, 2001

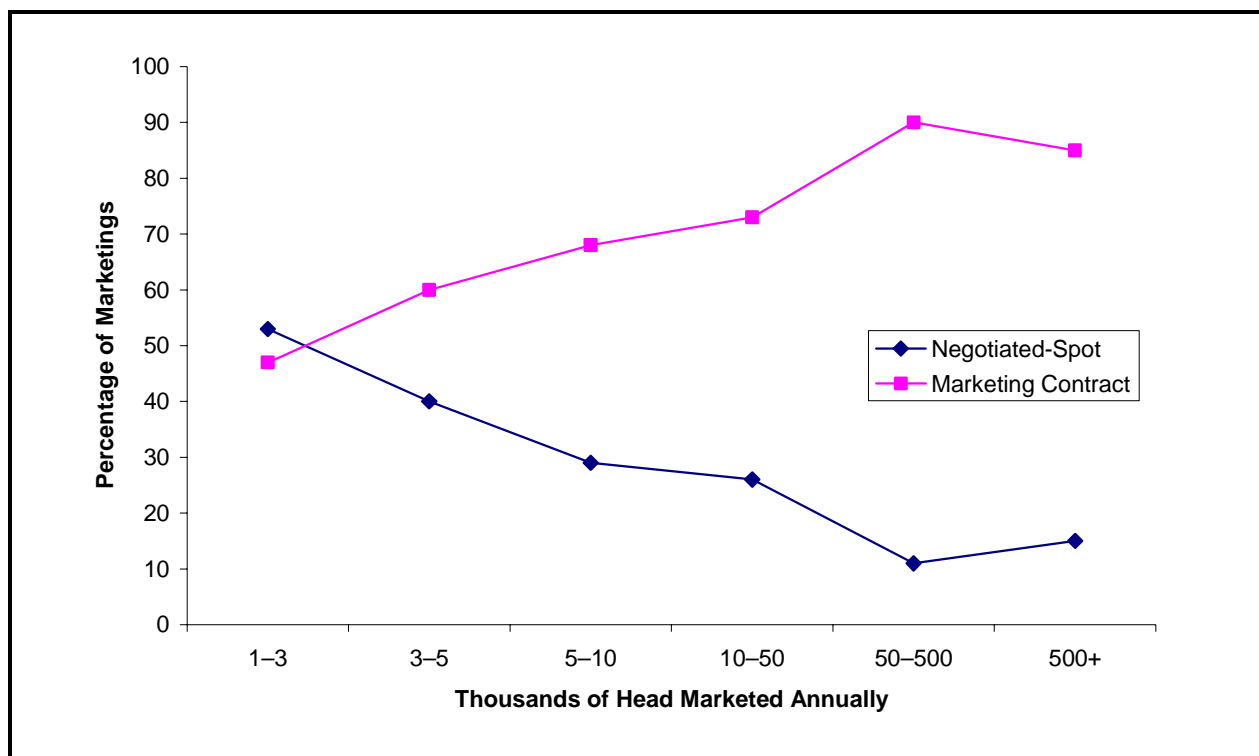
According to survey results published in 2001, negotiated-spot sales and marketing contracts appeared to be inversely related over the range of hog operations' size, with negotiated-spot sales diminishing and marketing contracts increasing as firms become larger.



Source: Derived from Lawrence, J. D., and G. Grimes. August 2001. "Production and Marketing Characteristics of U.S. Pork Producers, 2000." Staff Paper No. 343. Table 14a. Ames, IA: Department of Economics, Iowa State University.

Figure 3-5. Use of Negotiated-Spot Versus Marketing Contracts by Size of Hog Operation, 2004

According to survey results published in 2004, the previously documented (in 2001) inverse relationship between marketing contracts and negotiated-spot sales as hog operations became larger has changed, with the largest hog operations (500,000+ head) increasing the use of negotiated sales and decreasing the use of marketing contracts.



Source: Derived from Boessen, C., J. D. Lawrence, and G. Grimes. July 2004. "Production and Marketing Characteristics of U.S. Pork Producers—2003." Table 20. Department of Agricultural Economics Working Paper No. AEWP 2004-04.

Interestingly, the follow-up survey in 2003 reported in Boessen, Lawrence, and Grimes (2004) refutes some of the conclusions one might have drawn from the 2000 survey results alone. Although the inverse relationship between size and use of negotiated-spot marketings was mostly revealed again in the 2003 survey, the trajectory (slope) was less dramatic. In 2003, the number of negotiated-spot marketings increased from 10 to 11 percent for operations marketing 50,000 to 500,000 head and increased from 1 percent to 15 percent for operations marketing 500,000 head or more. Boessen, Lawrence, and Grimes noted this substantial change and suggested that a number of factors could be leading larger producers to sell more on the spot market. In particular, they suggested that these increased spot sales could be the packers' and large producers' response to concerns about the "thinning" of the

It is in the best interest of the seller firms to maintain volume in the negotiated market because many of the contract agreements use these daily negotiated market quotes.

spot market and the numerous proposals for related legislation to rectify this diminishing market. That is, as the authors note, it is in the best interest of the seller firms to maintain volume in the negotiated market because many of the contract agreements use these daily negotiated market quotes. Other explanations put forward by Boessen, Lawrence, and Grimes include the previous experience of the 1990s in which packers with fewer contractual arrangements fared better in their ability to buy lower-priced hogs. Another possible explanation put forward is that some of the larger firms have established a level of financial strength that allows them to take on more exposure to the negotiated market.

3.3.2 Terms Used in Hog Marketing Arrangements

NPPC (2000a) distinguishes between marketing contracts and production contracts, as the former requires a sales transaction of pigs between two parties and production contracts pay for services or production activities within a production process.

Before discussing and describing the terms used in hog marketing arrangements, it is important to differentiate between a production contract and a marketing (or procurement) contract because these contracts are the most common methods used by packers to secure a consistent supply of hogs (USDA-GIPSA, 2004a). A **production contract** involves a contractor that retains ownership but supplies the hogs to a producer who cares for and raises them according to standards of the contract. The contractor bears any market price risk of the hog and pays the producer on some piece-rate based on measurable performance and productivity and usually with the possibility of an incentive bonus for superior performance. A **marketing contract** specifies the terms of a future sale of producer-owned hogs to a packer. These contracts vary significantly but specify the quality type of the hogs to be delivered, the number of hogs to be delivered, and the price or price formula to be used to calculate the value of the hogs. NPPC (2000a) distinguishes between marketing contracts and production contracts, as the former requires a sales transaction of pigs between two parties and production contracts pay for services or production activities within a production process. This section delineates the common terms used in marketing contracts.

There are two primary types of marketing contracts in the hog industry: market access and risk share contracts. **Market access** contracts, as the name suggests, give producers access only to markets and do not include any risk sharing. Prices are determined using either **formula pricing** (based on a

negotiated market price or futures prices) or a **fixed price** (a forward contract). Table 3-3 reveals that hog or meat market formula [a] and other market formula [b] combined account for 50.2 percent of hogs sold in January 2005. Hayenga et al. (2000) described formula prices, citing Buhr and Kunkel (1999), as a mechanism to establish prices over extended periods in cases where multiple sales of hogs are forward contracted and there is concern about establishing prices. They stated that the formula price is based off a “price determining market.” This price-determining market is a market that is thought to do a reasonable job at establishing prices. This formula price will move with the price-determining market and therefore does not generally provide price-risk protection (Hayenga et al., 2000).

Boessen, Lawrence, and Grimes (2004) established that the use of futures markets increases with the increase in the size of the firm. Based on the findings of their 2003 survey, they estimated that 83 percent of the firms in the 50,000- to 500,000-head marketing category and 67 percent of firms in the 500,000 or more head marketing category use futures markets. They also established that the primary reason producers choose not to use futures is because of poor results in the past. This reason was ranked more significantly than the often-stated reason that futures are too complicated across all size classes.

Risk share contracts, as the name suggests, share some of the price risk between the packer and the producer. Lawrence (1994) identified two types of risk-sharing agreements: **cost-plus** and **price-window**. **Cost-plus contracts** tie the price received to the cost of producing the hogs by way of a production budget and feed prices. These determine prices using a base cost of production estimate combined with a feed-price adjustment factor to determine “cost” and then add some profit margin to determine the “plus.” The sum of the cost and the plus establishes the price. Notably, this contract determines a price for hogs that is independent of the current market price of hogs (i.e., the spot price). When hog prices are low, this is a favorable type of contract for the grower; when hog prices are high, it is more favorable to the packer.

Lawrence (1994) explained that **price-window contracts** establish a price range determined by an upper and lower price

boundary. When market prices are inside the boundaries, the producer receives the prevailing market price, but when market prices are outside the boundary, producers and packers share the risk. Most commonly, the difference between the boundary (upper or lower) is split equally between the producer and packer. Hayenga et al. (2000), in their description of cost-plus contracts, pointed out that these contracts may also have a balancing clause, more commonly referred to as a ledger, in which payments made to producers when market prices are below contract floor price must be paid back when the contract base price exceeds the cost-plus formula.

Lawrence (1994) also pointed out that cost-plus and price-window contracts use other important terms, such as carcass-merit pricing, with a minimum grade to qualify for the contract. Some contracts require producers to commit a portion of their expected marketings to the packer, and others require that producers commit all of their marketings to the packer. Requirements for genetic stock, nutritional practices, facilities, and other production requirements might be stipulated. Importantly, as noted by Lawrence, contracts range from 5 to 10 years in length to ensure that prices have time to pass through both a high and low range.

Hayenga et al. (2000) identified a third long-term risk-sharing contract referred to as a **price-floor contract**. This type of contract sets a minimum price for the producer, and in return, the producer compensates the packer by placing a portion of the hog price above a predetermined ceiling level in an account to subsidize the floor price during low-price periods. This contract is akin to a futures put option in which the seller (the packer) guarantees a floor and in return accepts compensation from the buyer (the producer).

Another important structural change or transformation that has transpired in the hog industry, particularly with respect to marketing, is the pricing system under which hogs are sold.

Another important structural change or transformation that has transpired in the hog industry, particularly with respect to marketing, is the pricing system under which hogs are sold. Hogs can be sold via a **liveweight** pricing system or a **carcass-merit** system. The liveweight system does not explicitly provide either premiums or discounts for desirable or undesirable carcass traits. Plain (2000) pointed out that in 1980 about 8 percent of hogs were marketed via a carcass merit system. This percentage increased to about 75 percent by 1999. The results of an April 2000 survey of packers reported in

Hayenga et al. (2000) revealed that in 1999, 8 percent of cash market purchases were on a liveweight basis, whereas 18.8 percent of purchases were on a carcass-merit basis. Schroeder, Mintert, and Berg (2004) noted that larger farms are more likely to market hogs based on carcass merit. Indeed, survey data from Lawrence and Grimes (2001) for marketing activities in 2000 indicated that large operations marketing more than 50,000 head annually sold 97 percent of their production via carcass-merit pricing. The same survey revealed that even smaller firms have turned to carcass-merit pricing, with farms marketing between 1,000 and 3,000 head annually selling more than 60 percent of their hogs via carcass merit and farms marketing 3,000 to 10,000 head selling 80 percent of their hogs via carcass merit.

Martinez and Zering (2004) stated that in 1992 several of the largest pork-packing companies adopted a new carcass-measurement technology and a new pricing method. They described this new technology as consisting of an optical probe used to distinguish backfat from lean tissue (the Fat-O-Meat'er), combined with a scale and linked to a computer. The ability to establish detailed measurements and the associated computing capability has allowed packers to introduce their own pricing grids. These grids consist of a price adjustment to a base price that depends on carcass weight and estimated carcass lean percentage. Martinez and Zering attributed the increase in leaner hogs at more desirable weights to the popularity of carcass-pricing programs. They cited two surveys of large U.S. pork packers, one in 1992 (Morgan et al., 1994) and one in 2002 (Miller, 2004), that found that the average hog backfat thickness fell by 36 percent, lean muscle increased from 49.5 percent to 55.5 percent, and liveweight increased by 10 pounds.

One interpretation of this shift toward merit pricing is the increased importance of quality to the marketing of hogs. Schroeder, Mintert, and Berg (2004) pointed out that carcass-merit pricing involves valuing each hog carcass separately and allows packers to signal producers concerning desirable attributes. They further discuss how carcass-merit pricing systems generally begin with a base carcass price and carcass quality premiums, and discounts are added to the base price to calculate net price for each individual carcass. Complicating matters from a price information standpoint is the fact that

each packer has different base prices as well as premium and discount schedules. This makes comparing prices across packers difficult without knowing both the base price and the particular premium and discount schedule for each packer (Schroeder, Mintert, and Berg, 2004).

In 1999, The Livestock Mandatory Reporting Act (LMRA) was promulgated for beef, pork, and lamb because of controversy surrounding prices being paid for livestock and concerns that the voluntary price reporting system was inadequate.

In 1999, The Livestock Mandatory Reporting Act (LMRA) was promulgated for beef, pork, and lamb because of controversy surrounding prices being paid for livestock and concerns that the voluntary price reporting system was inadequate. The controversy entailed several concurrent particular concerns in the pork industry. McBride and Key (2003) outlined some of these controversies with the underlying theme of “public policy concerns and market conduct” and noted the following specific concerns. First, citing Gants (1999), producer prices for hogs in late 1998 fell to the lowest level in over a quarter of a century (since 1972); after adjusting for inflation, producer prices for hogs were the lowest this century. Furthermore, despite the availability of cheap hogs, retail prices did not decline, thereby increasing the marketing margin or retail-farm margin beyond the farm-gate. This prompted senators to urge the Secretary of Agriculture to investigate. McBride and Key (2003) pointed out that many hog producers were concerned that the cash market was being reduced to a residual market. This was detrimental to producers who traded their hogs on this market. Attention from the public and legislators, lack of transparent information from hog contract sales, and increased margins in the hog packing industry were important reasons for the passage of LMRA in 1999 (McBride and Key, 2003).

With the passage of LMRA, hog price reporting changed dramatically in 2001 when all major packers began providing hog pricing data to USDA electronically twice daily (Schroeder, Mintert, and Berg, 2004). USDA-AMS began mandatory hog price reporting in April 2001, resulting in an abundance of hog-price information. AMS reports (1) daily prior-day plant delivered quantities (lm_hg200.txt); (2) slaughtered hogs (lm_hg2001.txt) price summaries; and (3) head counts for hogs purchased via five different live and carcass basis purchase types: negotiated, other market, swine or pork market formula, other purchases, and packer sold. Recall that direct comparisons across type are not meaningful for the nonnegotiated marketing share because the definitions have changed over time (Grimes and Plain, 2005). Schroeder,

Mintert, and Berg (2004) described these categories as follows: negotiated as a carcass-based negotiated cash market trade; swine or pork market formula as a formula based on a quoted hog or pork price; other market formula as typically based on the lean-hog futures price; other purchase agreements as agreements including feed cost and breed programs; and packer sold as packer-owned hogs sold to other packers. In addition to the prior-day report, two same-day national summaries of plant-delivered hog purchases, morning (lm_hg202.txt) and afternoon (lm_hg203.txt), are reported by the five purchase types. The suite of USDA-AMS hog reports also includes base prices and head counts comprising three regions—Iowa-Minnesota, Western Corn Belt, Eastern Corn Belt—and a national price in its national direct hog price comparison report (nw_ls831.txt).

Grimes and Plain concluded that producers would be best to negotiate marketing contracts that use either the Iowa-Minnesota or Western Corn Belt price from the afternoon or prior-day report as their base price.

Grimes and Plain (2005a) analyzed the morning, afternoon, prior-day, and regional reports for price differences and trends. Their findings provide useful insights to producers about how packers might be bidding. Producers would be best to avoid the morning report and to use either afternoon or prior-day reports to set their base prices. Further, they recommended that producers use either the Iowa-Minnesota or Western Corn Belt prices and avoid the lower Eastern Corn Belt price. Interestingly, the most aggressive bidding is done in the late morning and early afternoon, with Iowa-Minnesota prices tending to be the highest across regions. Grimes and Plain concluded that producers would be best to negotiate marketing contracts that use either the Iowa-Minnesota or Western Corn Belt price from the afternoon or prior-day report as their base price. The rationale is that these prices will not only be higher but also trade larger volumes and extend over a longer period (especially the prior-day report), thus making them less susceptible to manipulations. These results, combined with the continuation of mandatory price reporting, are useful and valuable to producers.

Some analysts (e.g., Schroeder, Mintert, and Berg [2004]) have been critical of mandatory price reporting and believe the lack of information about types of hogs makes USDA's base prices of limited value. They pointed out that the problem with base prices is that it is difficult to discern whether day-to-day variation is due to quality differences or price differences for similar quality. To improve the usefulness of mandatory price

reporting, Schroeder, Mintert, and Berg suggested that greater detail about the marketing arrangement associated with base prices is warranted.

NPPC (2000a) identified other key performance clauses used in hog marketing contracts. These key clauses include the **delivery schedules**, which are identified as the most important contract component. Provisions should also specify what happens in the event of **uncontrollable events** that prevent performance, such as a natural disaster. **Rights of first refusal on additional production** are also common and prevent a seller from marketing additional hogs to a buyer while under contract to another buyer, even for hogs that are not under contract for delivery. Provisions need to clearly spell out which pricing method will be used to determine the value of the hog. **Shipping and handling costs** and who bears these costs should be spelled out in agreements. **Quality specifications** should also be spelled out in the agreement because these are likely to be more stringent than simple lean-weight grids used in spot markets. **Remedies for default**, specifying action to be taken if either party defaults, should be included. **Financial disclosures** might be included in the provisions, particularly if ledger accounts are used as part of the agreement. **Confidentiality clauses** are common to prevent either party from disclosing the terms of the contract to third parties. Other clauses include **extent of contract obligations, implied duty of good faith, changed circumstances, remedies for breach, assignment of marketing contracts, buyer's bankruptcy, termination of contract, alternative remedies, financing considerations, contract length, and recovery of capital investment**. For details about these clauses, see NPPC (2000a).

3.3.3 Stated Reasons for Use, Drivers for Change in Use, and Opinions Regarding Alternative Marketing Arrangements in the Hog Industry

Hayenga, Harl, and Lawrence (2000) noted that considerable literature is dedicated to determining the factors motivating participation by farmers in contracting arrangements or vertical integration. They also noted that the circumstances leading to adopting contracting arrangements are commodity specific. However, they put forward some general reasons that farmers decide to get involved in contracts, which were summarized by USDA (1996) as the following: income stability, improved

efficiency, market security, and access to capital (see Hayenga, Harl, and Lawrence [2000]) for details on each of these merits). In addition, the rationale for packers was summarized by USDA (1996) as the following: controlling input supply, improving response to consumer demand, and expanding and diversifying operations.

Moreover, NPPC (2000a) identified the motivations for producers as price-risk shifting, market assurance, reduced marketing management, and supply assurance. Motivations for packers are supply assurance, quality assurance, price-risk shifting, and regional supply changes. USDA (1996) also identified two primary potential disadvantages of contracts: a loss of independence to the producer, and inequitable risk and return sharing.

These results indicate that the primary motivation for long-term contracts from the packer's perspective is supply related, both from a consistency and quality standpoint, and price-risk management and actual prices paid are of second-order importance.

Hayenga et al. (2000) reported results of an April 2000 survey of 13 of the nation's largest pork processors concerning their procurement and merchandising activity in 1999. As part of this survey, processors were asked to rate a list of potential motivations for the use of long-term marketing contracts by assigning a score from 1 to 5, with 1 = not important to 5 = very important. The responses to these questions are reproduced in Table 3-5, as reported by Hayenga et al. (2000). Interestingly, securing more consistent quality hogs ranked first [4.3], followed closely by securing higher-quality hogs [4.0] and assuring food safety [3.8]. Next was a group of three motivations that included reduction of plant operating expenses, week-to-week supply or price management, and reduced search costs, all with a score of 3.5. The two lowest ranked motivations were long-run price-risk management [3.0] and the ability to purchase hogs for a lower price [2.3]. These results indicate that the primary motivation for long-term contracts from the packer's perspective is supply related, both from a consistency and quality standpoint, and price-risk management and actual prices paid are of second-order importance.

Hayenga et al. (2000) reported that in open-ended questions about the driving forces for entering into more long-term contracts, more than half of the packers identified the demand by producers as the driving force. Producers' desires came from wanting to be assured market access, to share information about consumer concerns, and to secure financing for their

Table 3-5. Motivations for Increased Coordination of the Pork Supply Chain: Marketing Arrangements, 1999

Increased coordination has been motivated primarily by packers wanting to secure more consistent quality hogs and by producers for gaining access to capital.

Reasons	Scores ^a
Packers	
Secure more consistent quality hogs	4.3
Secure higher-quality hogs	4.0
Assure food safety	3.8
Reduce plant operating costs by improving plant scheduling	3.5
Week-to-week supply/price management	3.5
Reduce costs of searching for hogs to procure	3.5
Long-run price-risk management	3.0
Able to purchase hogs for lower price	2.3
Producers	
Access to capital	4.6
Reduced price risk	3.9
Securing market outlet	3.8
Ability to sell hogs at a higher price	3.6
Ability to secure a quality matrix	3.5

^aScale of 1 to 5, 1 = not important to 5 = very important.

Source: Hayenga, M., T. Schroeder, J. Lawrence, D. Hayes, T. Vukina, C. Ward, and W. Purcell. May 2000. "Meat Packer Vertical Integration and Contract Linkages in the Beef and Pork Industries: An Economic Perspective." Washington, DC: American Meat Institute.

operations. Concerning the motivations for producers as perceived by the packers based on their interactions with producers, the following reasons (in order of importance) were identified in the Hayenga et al. (2000) survey: access to capital [4.6], reduced price risk [3.9], securing a market outlet [3.8], ability to sell hogs at a higher price [3.6], and ability to secure a quality matrix [3.4]. In summary, the survey results reveal that motivations are different for packers and producers. For the packer, securing a steady supply of high-quality hogs to remain profitable is most important. For the producer, obtaining reasonable capital, having access to a market that will buy the hogs, and avoiding downturns in the market to remain profitable are most important.

In their 2003 survey, Boessen, Lawrence, and Grimes (2004) repeated a series of opinion questions pertaining to marketing contracts. Their analysis and discussion focused on comparing

responses in 2000 and 2003. For a discussion of differences in responses, see Boessen, Lawrence, and Grimes (2004, pp. 16–21). Table 3-6 reproduces the 2003 responses documented in Figures 5 through 13 of Boessen, Lawrence, and Grimes (2004) for the purposes of this discussion. Furthermore, some additional auxiliary analysis is provided by categorizing the opinion responses into either favorable or unfavorable opinions. For each of these categories and across each firm size, an average of the responses is calculated to highlight the importance of firm size to marketing contracts and opinions. Figures 3-6, 3-7, and 3-8 are based on recalculations of information in Table 3-6.

Large hog producers marketing 50,000 or more head annually report they feel much less “unfavorable” towards contract marketing compared to small producers.

Figure 3-6 reveals that responses to favorable opinions concerning marketing are scale neutral, whereas responses to unfavorable opinions of contract marketing are scale biased; specifically, firms marketing more than 50,000 head annually feel much less “unfavorable” than the smaller firms marketing less than this volume. The distinction between the favorable opinions being scale neutral, whereas the unfavorable opinions are not, is clarified by comparing Figures 3-7 and 3-8. The unfavorable opinions all slope downward as firm size increases.

Table 3-6 reveals that the favorable opinions toward marketing contracts received an average response of 4.1 over all opinions and across all firm sizes. The opinions that had the highest average across all firm sizes were that producers plan to continue with a contract after the current one matures [4.5], producers felt they were treated fairly [4.3], and marketing contracts help coordinate slaughter [3.6]. The average of unfavorable opinions across all firm sizes reveals that the strongest opinions were that marketing contracts have caused lower cash prices [4.7], producers with contracts get higher prices [4.1], and packers showed undue preference in offering contracts [3.9].

In summary, these further calculations using the survey data from Boessen, Lawrence, and Grimes (2004) reveal several important findings concerning producers’ opinions about marketing contracts and are helpful in conceptualizing what might happen in the future. Specifically, favorable opinions and the strength of their merits are relatively scale neutral,

Table 3-6. Opinions on Marketing Contracts, 2003^a

Across the range of hog operation sizes, producers feel that they will plan to continue with a contract after the current one matures (favorable opinions) and that marketing contracts have caused lower cash-market prices (unfavorable opinions):

	Firm Size (thousands of head marketed annually)						
	1-3	3-5	5-10	10-50	50-500	500+	Average ^c
Favorable Opinions^b							
Plan to continue with a contract after current one matures	4.3	4.1	4.1	4.3	4.9	5.0	4.5
Felt they were treated fairly	4.5	4.2	4.1	4.4	3.9	4.4	4.3
Helps coordinate slaughter	3.3	3.2	3.6	3.7	3.7	4.0	3.6
Average ^c	4.0	3.8	3.9	4.1	4.2	4.5	4.1
Unfavorable Opinions^b							
Have caused lower cash-market prices	4.7	4.9	4.7	4.6	4.7	4.3	4.7
Producers with contracts get higher prices	4.0	4.3	4.1	4.1	4.6	3.4	4.1
Packers showed undue preference in offering contracts	4.5	4.3	4.0	3.9	4.0	2.9	3.9
Should be more closely monitored by USDA	4.5	4.5	4.3	4.3	1.4	1.4	3.4
Prefer to market all hogs on cash market	4.5	3.9	3.7	3.3	2.2	1.9	3.3
Should be made illegal	3.6	3.5	3.4	3.1	1.4	1.4	2.7
Average ^c	4.3	4.2	4.0	3.9	3.1	2.6	3.7

^aScale of 1 to 5, 1 = strongly disagree to 5 = strongly agree.

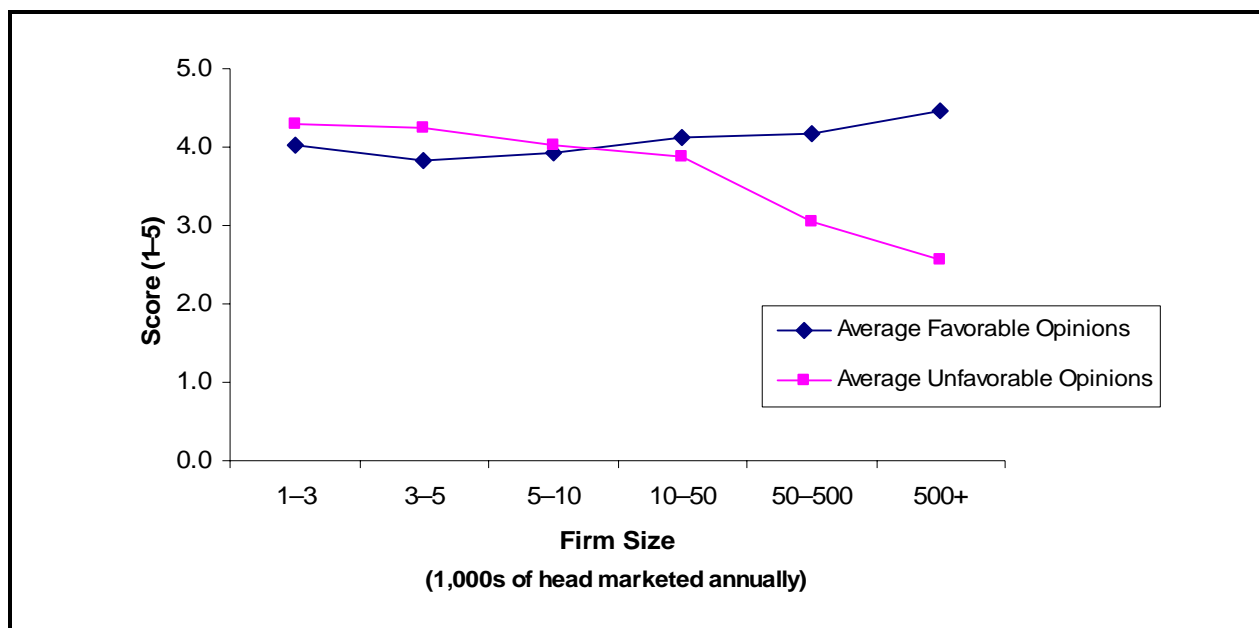
^bThe determination of the opinion being favorable or unfavorable is not part of the original source analysis but is added here.

^cThe calculation of averages over the favorable and unfavorable responses is not part of the original sources analysis but is added here.

Source: Derived from Boessen, C., J. D. Lawrence, and G. Grimes. July 2004. "Production and Marketing Characteristics of U.S. Pork Producers—2003." Department of Agricultural Economics Working Paper No. AEWP 2004-04.

Figure 3-6. Opinions on Marketing Contracts by Firm Size, 2003

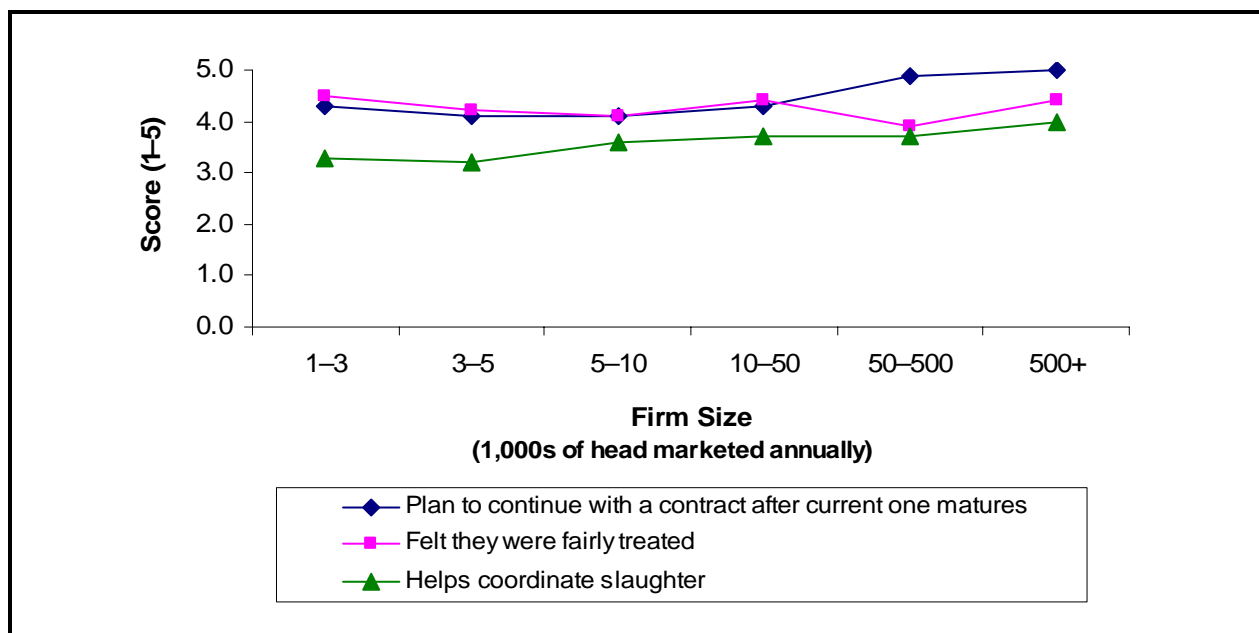
Favorable opinions appear to be relatively scale neutral, whereas unfavorable opinions are not.



Source: Derived from Boessen, C., J. D. Lawrence, and G. Grimes. July 2004. "Production and Marketing Characteristics of U.S. Pork Producers—2003." Department of Agricultural Economics Working Paper No. AEWP 2004-04.

Figure 3-7. Favorable Opinions on Marketing Contracts, 2003

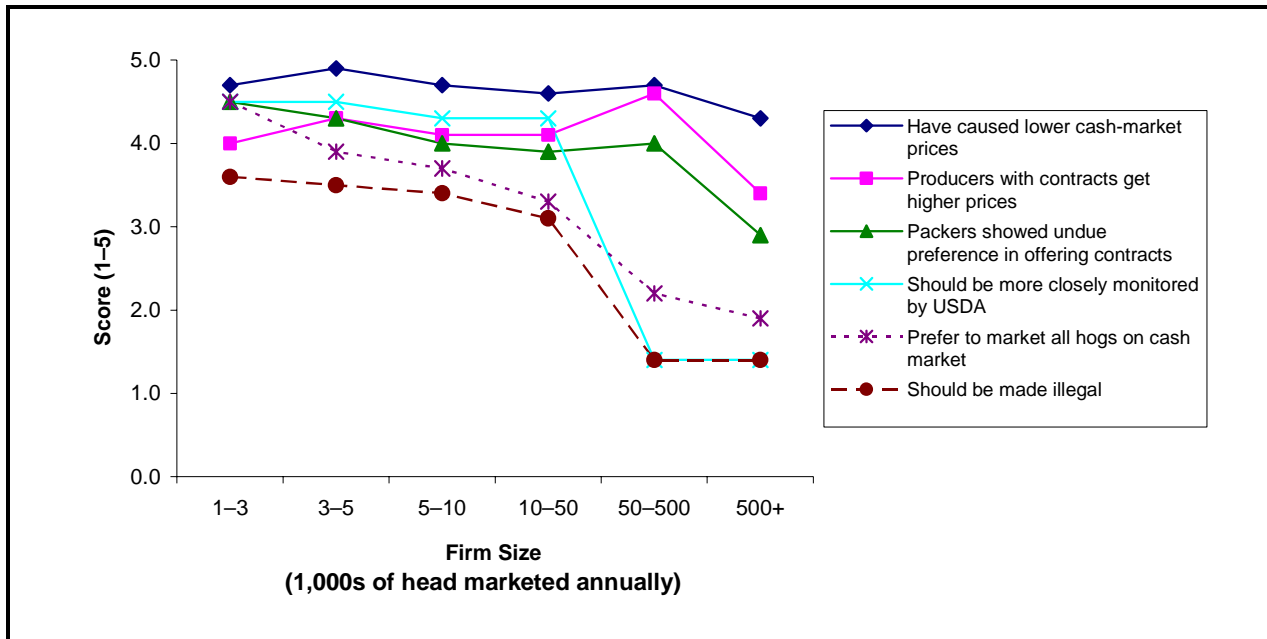
Of the favorable opinions, hog producers feel more strongly about further use of contracts and being fairly treated than they do about it facilitating coordination with slaughter.



Source: Derived from Boessen, C., J. D. Lawrence, and G. Grimes. July 2004. "Production and Marketing Characteristics of U.S. Pork Producers—2003." Department of Agricultural Economics Working Paper No. AEWP 2004-04.

Figure 3-8. Unfavorable Opinions on Marketing Contracts, 2003

Of the unfavorable opinions, hog producers across all sizes of operations feel most strongly that marketing contracts have lower cash-market prices and least strongly that marketing contracts should be made illegal.



Source: Derived from Boessen, C., J. D. Lawrence, and G. Grimes. July 2004. "Production and Marketing Characteristics of U.S. Pork Producers—2003." Department of Agricultural Economics Working Paper No. AEWP 2004-04.

meaning producers of all sizes are mostly in agreement about the favorable aspects of marketing contracts, although the "favorable opinion" curve in Figure 3-6 does slope upward somewhat. The strongest opinion is that producers plan to continue to contract after the current contract matures. In contrast, feelings about unfavorable opinions are not neutral with respect to the size of operation, with smaller producers having more conviction. The strongest producer opinion is that marketing contracts have lowered cash market prices.

3.4 EMPIRICAL LITERATURE ON MARKETING ARRANGEMENTS IN THE LAMB AND LAMB MEAT INDUSTRIES

This section summarizes the literature on use of marketing arrangements in the lamb industry. Although the literature is limited, it provides some background information regarding the role of alternative marketing arrangements in the lamb industry. However, significant gaps in the literature underscore the need for additional data collection that will occur later in this study.

The lamb marketing literature outlines available options for selling feeder lambs to feedlots, fed lambs to packers, lamb carcasses to breakers, and lamb products to retailers and food service establishments. Some authors describe the effects of various marketing arrangements on these sales. In addition, information on the success and failure of producer-owned cooperatives in the lamb industry provides insight about the use of contracts.

Bastian and Whipple (1998) listed the following options as available to lamb producers for selling weaned lambs:

- sell feeder lambs to feedlots
- retain ownership of lambs through contract feeding
- sell fed lambs directly to packers

In addition, they listed the following marketing methods used to sell feeder and slaughter lambs:

- direct sales between lamb producer and feedlots or packers
- sales through buyers and dealers to feedlots or packers
- sales at terminal markets
- traditional and special auction sales
- electronic and video sales
- direct marketing to consumers

Packer ownership was driven by sharp decreases in sheep inventories and the resultant desire to secure slaughter lamb supplies.

In the 1980s, the most common method of selling feeder lambs was direct negotiation between producers and feeders, and the most common method of selling fed lambs was direct sales under contract with packers. Packer feeding of lambs was reported to be about 28 percent of total lamb slaughter in the 1990s Bastian and Whipple (1998). Most packer feeding was concentrated in Colorado, California, Texas, Washington, Kansas, and Iowa. Packer ownership was driven by sharp decreases in sheep inventories and the resultant desire to secure slaughter lamb supplies. Bastian and Whipple argued that declining numbers of lamb packers indicate a deterioration of lamb marketing infrastructures. They suggested a need for more coordination across segments of the lamb industry to improve efficiency and responsiveness to consumer demand.

Bastian and Whipple (1998) suggested a need for more coordination across segments of the lamb industry to improve efficiency and responsiveness to consumer demand.

Williams and Davis (1998) provided further descriptive information about methods of selling lambs and lamb products. They delineated these methods by size of operation and region of the country and discussed a variety of issues related to downstream lamb marketing. In their discussion, they distinguished between range producers that operate primarily in Western States and farm flock producers that operate primarily in Eastern States. According to Williams and Davis, large range lamb producers tend to sell feeder lambs directly to feedlots using contracts, or they feed their own lambs and sell fed lambs directly to packers using contracts. Small range producers sell feeder lambs at public auction and through intermediaries, but some also sell fed lambs directly to packers. Farm flock producers tend to produce and feed lambs and then sell fed lambs directly to packers.

Williams and Davis also noted that packers generally prefer to purchase slaughter lambs by the truckload (about 400 head) to minimize transportation costs. However, intermediaries sometimes consolidate small lots of lambs for contract sales directly to either feedlots or packers. As flock sizes declined in the 1990s, many producers were no longer able to supply a full truckload of uniform lambs to feedlots or packers. Thus, lamb sales at public auctions increased relative to the 1980s.

Custom feeding operations are also common in which a producer or packer retains ownership of the lambs while they are in the feedlot.

Some lamb feedlots are owned and operated by packers (Williams and Davis, 1998). Custom feeding operations are also common in which a producer or packer retains ownership of the lambs while they are in the feedlot. Producers that contract with a feedlot for custom feeding often contract with a packer to deliver lambs at a certain weight.

A substantial proportion of lamb carcasses are sold or transferred to breaker plants for further processing. Breakers serve several functions, including selling small orders of specific cuts to buyers, assuming risk of holding inventories of less desirable cuts, and offering credit terms for small and medium buyers. However, packers are increasingly performing the breaker activities at slaughter plants (Williams and Davis, 1998).

Contracting offers advantages to both lamb feeders and to packers or breakers.

Contracting offers advantages to both lamb feeders and to packers or breakers. Once fed lambs reach slaughter weight, they must be slaughtered in a timely fashion to avoid excessive weight gain and deterioration of meat quality. Contracts help to ensure that lambs are slaughtered at optimal weights (Williams and Davis, 1998). Packers use contracts to allow plants to operate as close to full capacity as possible and to help manage processed lamb inventories (Williams and Davis, 1998). Because lamb is a small proportion of most retailer meat sales, retailers often have significant bargaining power over packers and breakers. Retailers often receive bids from multiple suppliers but may choose not to accept any of them given that lamb products are a small proportion of sales (Williams and Davis, 1998).

Greer and Ward (2000) and Ward (2001c) compared use of traditional auctions, direct marketing, and other cash- or spot-market methods of selling slaughter lambs using 1996 data from the American Sheep Industry Association. As indicated in Table 3-7, the study described in these papers found that

- auctions were the predominant marketing method in the eastern United States;
- direct marketing was the most common marketing method in the western United States; and
- computer auctions, teleauctions, and slaughter lamb pools were used to a small extent in regions where these methods are available.

Greer and Ward (2000) and Ward (2001c) found sales price differences among fed-lamb marketing methods. However, the differences may have been attributable to regional differences in marketing methods.

Data prepared by USDA-APHIS (2003) for 2001 on sales of feeder and fed lambs provide some indication of marketing method use. The data were obtained from a random sample of sheep producers in 22 states and represented an estimated 87.4 percent of the U.S. sheep inventory. The data indicate that 95 percent of feeder lambs sold by feedlot operations were sold directly to packers without the involvement of an intermediary. Some of these sales were likely cash- or spot-market sales, and others were likely characterized as alternative marketing arrangements. For lambs sold by nonfeedlot operations (herded range, fenced range, and farm flock), 29 percent of lambs were

Table 3-7. Distribution of Sales Methods for Fed Lambs by Region, 1996

Fed lambs in the East and North Central regions are most frequently sold at auction, and lambs in the Mountain and West regions are most frequently sold through direct marketing.

Marketing Method	East (%)	North Central (%)	South Central (%)	Mountain (%)	West (%)
Auction	59.8	47.4	49.7	6.5	4.8
Direct	15.5	32.0	38.3	80.5	92.8
Computer auction	0.0	19.3	12.0	0.0	0.0
Teleauction	8.4	0.4	0.0	0.0	0.0
Lamb pool	16.4	0.9	0.0	13.0	2.4

Source: Ward, C.E. 2001c. "Slaughter Lamb Marketing and Price Differences." Extension Facts F-570. Stillwater, OK: Oklahoma Cooperative Extension Service, Oklahoma State University.

sold in auctions or sale barns. Remaining lambs were sold directly to a backgrounder, consumer, feedlot, dealer, packer, or other unspecified type of buyer. Some of these sales were likely cash- or spot-market sales.

In comparison to the numbers described above, GIPSA estimated that 89.9 percent of sheep and lambs sold in 2002 were sold to packers through nonpublic markets. The remaining 10.1 percent were sold to packers through public markets, which are defined as auction and terminal market sales. In two minor lamb-producing states (West Virginia and Kentucky), most lamb sales occur through auctions and dealers (O'dell et al., 2003; Chappell and Meyer, 1994).

A trend in the lamb industry has been an increase in the number of producer-owned cooperatives.

A trend in the lamb industry has been an increase in the number of producer-owned cooperatives. An example is the Dakota Lamb Growers Cooperative, which was formed to coordinate lamb marketing from birth through final product sales to ensure consistency and quality (Merwin, 2003). Lamb producers agree to follow written production protocols and deliver fed lambs to a combination receiving station/feedlot. Lambs that do not meet quality specifications are sold on the commodity market. Fed lambs are slaughtered under contract with a packing and breaking plant. Thus, contracts are used on both the procurement and sales side of the transactions.

However, not all cooperative ventures have been successful. In two case studies of failed producer-owned lamb marketing ventures, Smith et al. (1999) found that

- lack of written agreements for carcass supplies led to quality and quantity problems;
- without price contracts in place with the carcass supplier, the cooperative was forced to pay much higher prices than expected for carcasses;
- members of the cooperatives did not control enough volume supply to maintain a consistent supply of lamb meat throughout the year;
- cash flow problems emerged because of sporadic revenues caused by a lack of contractual agreements with retailers; and
- retailers wanted weekly quality and quantity guarantees that the cooperatives were unable to provide.

Thus, based on these reasons, one could conclude that the success of producer-owned cooperatives appears to depend on the use of contracts.

4 Interim Study Results

The results presented in this section are preliminary and based on review of the literature, discussions with industry participants, and review of contract documents used in the livestock industry.

In this section, we present the interim results of the study based on information available at this stage of the project. Specifically, we present descriptive findings related to the following:

- classifying and describing types of spot and alternative marketing arrangements used in the livestock and meat industries;
- identifying terms used in spot and alternative marketing arrangements;
- describing the availability of alternative marketing arrangements to market participants by type, size, and location of market participants;
- describing reasons given by market participants for entering into alternative marketing arrangements; and
- providing other descriptive information about marketing behavior for use in other parts of the study.

The industry participants addressed in this section include

- fed cattle and beef producers and packers;
- pork producers and packers;
- lamb producers, packers, and breakers; and
- meat processors, meat exporters, wholesalers, food service operators, and food retailers.

Table 4-1 provides a descriptive listing of industry participants in the livestock and meat industries. Livestock producers generally specialize in one species of livestock, but some operations produce multiple species. Companies that own large packing plants often slaughter multiple species, but each

Table 4-1. Types of Market Participants in the Livestock and Meat Industries^a

Livestock producers, meat packers, and meat processors may handle single or multiple species. Downstream market participants generally handle multiple species or meat types.

Livestock producers	<ul style="list-style-type: none"> ▪ Breeding operations ▪ Growing operations ▪ Feeding operations
Slaughter establishments	<ul style="list-style-type: none"> ▪ Single-species establishments ▪ Multiple-species establishments
Meat processors (and breakers)	<ul style="list-style-type: none"> ▪ Single-species establishments ▪ Multiple-species establishments
Wholesalers	<ul style="list-style-type: none"> ▪ Meat wholesalers ▪ Frozen food wholesalers ▪ General line grocery wholesalers ▪ Food service wholesalers
Exporters	<ul style="list-style-type: none"> ▪ Meat exporters
Food service operators	<ul style="list-style-type: none"> ▪ Commercial eating-place operations <ul style="list-style-type: none"> – Limited service/fast food – Full-service and other commercial eating places (e.g., hotels) ▪ Institutional food service (e.g., education, military, hospitals)
Retailers	<ul style="list-style-type: none"> ▪ Large supermarket firms (operate one or more general line distribution centers) ▪ Independent and small chain supermarket firms (no general line distribution center) ▪ Club stores and other discount retailers ▪ Other retailers (e.g., meat markets, general merchandise retailers)

^aDealers and brokers may serve as intermediaries between market participants at different stages of production.

Working definitions for terminology related to alternative marketing arrangements in the livestock and meat industries are provided in Appendix A.

species tends to be slaughtered in different establishments. Smaller packing plants often slaughter multiple species. Most packers also conduct processing activities within the same establishment that slaughters livestock and thus are also classified as processors. However, many other processing-only establishments purchase meat inputs from packers and conduct processing activities with either single species or multiple species. Beyond the processing stage, companies that carry meat products generally carry all types of meat; however, a few distributors specialize in only one of a few types of meat.

In this section, we begin with a general overview of the classifications of alternative marketing arrangements by stage of production, key terms of alternative marketing arrangements, and reasons for use of alternative marketing arrangements. We follow with sections that provide interim study results for producers and packers of fed cattle and beef,

hogs and pork, and lambs and lamb meat and for the downstream industries.

4.1 KEY DIMENSIONS OF ALTERNATIVE MARKETING ARRANGEMENTS

“Alternative marketing arrangements” refer to all possible alternatives to the cash or spot market.

In this report, cash or spot market transactions refer to transactions that occur immediately or “on the spot.” These include auction barn sales; video or electronic auction sales; sales through order buyers, dealers, and brokers; and direct trades. The terms “cash market” and “spot market” are used interchangeably. “Alternative marketing arrangements” refer to all possible alternatives to the cash or spot market. These include arrangements such as forward contracts, marketing agreements, procurement or marketing contracts, packer owned, production contract, custom feeding, and custom slaughter. For alternative marketing arrangements at the producer level, livestock may be owned by the individual(s) that owns the farm or facility, or they may be owned by a different party.

Key dimensions that define a marketing arrangement include

- procurement or sales method,
- ownership method of the animal or product,
- pricing method (including formula pricing base and internal transfer pricing method), and
- valuation method for livestock.

As part of developing and pretesting the data collection instruments to be fielded during later parts of the study, we developed classifications of spot and alternative marketing arrangements in the livestock and meat industries. For producers, packers/processors, and downstream segments of the industry, particular types of spot and alternative marketing arrangements are used for purchasing inputs and selling outputs. In addition to the type of procurement or sales method, other key dimensions that define each marketing arrangement are ownership method of the animal or product, pricing method, and valuation method for livestock. Pricing method is further defined by formula base, if formula pricing is used, and internal transfer pricing method, if the product is internally transferred within a single company. Table 4-2a provides a listing of marketing arrangements and their key dimensions for beef producers, pork producers, and lamb producers. Table 4-2b provides a similar listing for beef packers/processors, pork packers/processors, and lamb packers/processors. Table 4-2c provides a listing for the downstream segments—wholesale, export, food service, and retail. We describe the marketing arrangements in more detail for specific species below.

Table 4-2a. Summary of Marketing Arrangements in the Livestock and Meat Industries: Producer Segment

Marketing arrangements for procurement/purchasing or sales can be categorized as spot market or alternative arrangements. Ownership, pricing, and valuation methods are key dimensions of all marketing arrangements.

P = Procurement/Purchasing S = Sales		Beef Producers	Pork Producers	Lamb Producers
Procurement or Sales Method	Spot Market Transactions			
	Auction barns	P/S	P/S	P/S
	Video/electronic auctions	P/S	P/S	P/S
	Dealers or brokers	P/S	P/S	P/S
	Direct trade	P/S	P/S	P/S
	Alternative Marketing Arrangements			
	<i>Livestock Owned by the Producer</i>			
	Forward contract	P/S	P/S	P/S
	Marketing agreement	P/S	P/S	P/S
	Procurement or marketing contract		P/S	
	Packer fed/owned ^a	P/S	P/S	P/S
	Custom slaughtered for producer	S		S
	<i>Livestock NOT Owned by the Producer</i>			
	Production contract		P/S	
	Delivered for custom feeding/backgrounding	P/S		P/S
Ownership Method for Livestock	Sole ownership	P/S	P/S	P/S
	Joint venture	P/S	P/S	P/S
	Shared ownership	P/S	P/S	P/S
	Partner arrangement	P/S	P/S	P/S
	Owned by integrator or packer	P/S	P/S	P/S
Pricing Method	Individually negotiated pricing	P/S	P/S	P/S
	Public auction	P/S	P/S	P/S
	Sealed bid	P/S	P/S	P/S
	Formula pricing	P/S	P/S	P/S
	Production contract compensation formula		P/S	
	Internal transfer pricing	P/S	P/S	P/S
	Delivered for custom feeding/backgrounding	P/S		P/S
	Custom slaughtered for producer	S		S

(continued)

Table 4-2a. Summary of Marketing Arrangements in the Livestock and Meat Industries: Producer Segment (continued)

P = Procurement/Purchasing S = Sales		Beef Producers	Pork Producers	Lamb Producers
Formula Base	Individual or multiple plant average price	S	S	S
	USDA publicly reported price			
	USDA live quote	P/S	P/S	P/S
	USDA dressed or carcass quote	S	S	S
	USDA cut-out value	S	S	S
	USDA boxed beef price	S		
	USDA boxed pork price		S	
	USDA boxed lamb price			S
	Chicago Mercantile Exchange (CME) lean hog futures		P/S	
	CME cattle futures	P/S		
	Retail price	S	S	S
	Subscription service price	P	P	P
	Other market price	P/S	P/S	P/S
	Cost of production	P/S	P/S	P/S
	Corn or soybean meal futures		S	
Valuation Method	Per head			S
	Liveweight purchase	S	S	S
	Carcass weight purchase, NOT dependent on grid value (merit)	S	S	S
	Carcass weight purchase, dependent on grid value (merit)	S	S	S
	Primal cuts based		S	

^aAlso referred to as “company-owned farm” in the hog industry.

In addition to the key dimensions identified above, other key terms define the characteristics of alternative marketing arrangements. Based on the development and pretesting of the data collection instruments and the industry interviews, the key terms include

- whether the arrangement is oral or written,
- who arranges and pays for transportation of livestock and meat,
- how far in advance of delivery transactions are negotiated,
- duration of contracts (if there is a contract),
- quantity requirements,
- quality requirements,
- how quality is measured,

Table 4-2b. Summary of Marketing Arrangements in the Livestock and Meat Industries: Packer and Processor Segments

Marketing arrangements for procurement/purchasing or sales can be categorized as spot market or alternative arrangements. Ownership, pricing, valuation, and pricing practices methods are key dimensions of all marketing arrangements.

P = Procurement/Purchasing S = Sales		Beef Packers	Pork Packers	Lamb Packers	Proces- sors
Purchase or Sales Method	Spot Market Transactions	S	S	S	S
	Auction barns	P	P	P	
	Video/electronic auctions	P	P	P	
	Dealers or brokers	P	P	P	
	Direct trade	P	P	P	
	Alternative Marketing Arrangements				
	<i>Livestock/Meat Owned by the Packer</i>				
	Packer fed/owned	P	P	P	
	Production contract (with packer or integrator)		P		
	Internal company transfer	S	S	S	P/S
	Forward contract	S	S	S	S
	Marketing agreement	S	S	S	S
	<i>Livestock/Meat NOT Owned by the Packer</i>				
	Forward contract	P	P	P	P
	Marketing agreement	P	P	P	P
	Procurement or marketing contract		P		
	Ownership Method				
	Sole ownership	P/S	P/S	P/S	P/S
	Joint venture	P/S	P/S	P/S	P/S
	Shared ownership	P/S	P/S	P/S	P/S
Pricing Method	Individually negotiated pricing	P/S	P/S	P/S	P/S
	Public auction	P	P	P	
	Sealed bid	P/S	P/S	P/S	P/S
	Formula pricing	P/S	P/S	P/S	P/S
	Production contract compensation formula		P		
	Internal transfer	P/S	P/S	P/S	P/S
	Price list	S	S	S	P/S
Formula Base	Individual or multiple plant average price	P/S	P/S	P/S	P/S
	Individual or multiple plant average cost of production	P/S	P/S	P/S	P/S
	USDA publicly reported price	S	S	S	P/S
	USDA live quote	P	P	P	
	USDA dressed or carcass quote	P	P	P	
	USDA cut-out value	P	P	P	
	USDA boxed beef price	P			
	USDA boxed pork price		P		
	USDA boxed lamb price			P	
	CME lean hog futures		P		
	CME cattle futures	P			
	Retail price	P/S	P/S	P/S	P/S
	Subscription service price	P/S	P/S	P/S	P/S
	Other market price	P/S	P/S	P/S	P/S

(continued)

Table 4-2b. Summary of Marketing Arrangements in the Livestock and Meat Industries: Packer and Processor Segments (continued)

P = Procurement/Purchasing S = Sales		Beef Packers	Pork Packers	Lamb Packers	Proces- sors
Internal Transfer Price	Price paid for purchased fed cattle	P			
	Price paid for purchased fed hogs		P		
	Price paid for purchased fed lambs			P	
	Reported market price	P	P	P	
	Measure of internal production cost with a profit margin	P	P	P	
	Measure of internal production cost without a profit margin	P	P	P	
Valuation Method	Per head			P	
	Liveweight purchase	P	P	P	
	Carcass weight purchase, NOT dependent on grid value (merit)	P	P	P	
	Carcass weight purchase, dependent on grid value (merit)	P	P	P	
	Primal cuts based		P		
Pricing Practices	Two-part pricing	S	S	S	S
	Volume pricing	S	S	S	S
	Exclusive dealings	S	S	S	S
	Bundling	S	S	S	S

- how prices are determined,
- what information is provided back to the seller regarding the assessment of the quality of purchased livestock,
- how disputes are resolved, and
- what termination options are available.

Table 4-3 provides a broad comparison of each of these key terms as they relate to cash or spot market transactions and the potential range of provisions in alternative marketing arrangements based on the industry interviews. In addition to these key terms, other additional terms might define specific types of alternative marketing arrangements. In the case of production contracts for hogs and custom feeding of beef cattle and lambs, the terms that define alternative marketing arrangements are substantially different because, rather than defining the terms of trade of products, these arrangements define the terms of trade of production services.

Table 4-2c. Summary of Marketing Arrangements in the Livestock and Meat Industries: Downstream Market Segments

Marketing arrangements for procurement/purchasing or sales can be categorized as spot market or alternative arrangements. Pricing methods and pricing practices are key dimensions of all marketing arrangements.

P = Procurement/Purchasing S = Sales		Whole- sale	Export	Food Service	Retail
Purchase or Sales Method	Spot Market Transactions				
	Video/electronic auctions	P/S	P/S	P	P
	Dealers or brokers	P/S	P/S	P	P
	Direct trade	P/S	P/S	P	P
	Alternative Marketing Arrangements				
	Forward contract	P/S	P/S	P	P
	Marketing agreement	P/S	P/S	P	P
	Internal company transfer	P/S	P/S	P	P
	Custom slaughtered	P	P	P	P
Pricing Method	Formula pricing	P/S	P/S	P	P
	Internal transfer	P/S	P/S	P	P
	Price list	P/S	P/S	P	P
	Flat pricing	P/S	P/S	P	P
	Or-better pricing	P/S	P/S	P	P
	Floor and ceiling pricing	P/S	P/S	P	P
Formula Base	USDA publicly reported price	P/S	P/S	P	P
	Retail price	P/S	P/S	P	P
	Subscription service price	P/S	P/S	P	P
	Futures price or price ratio	P/S	P/S	P	P
Internal Transfer Price	Reported market price	P/S	P/S	P	P
	Measure of internal production cost with a profit margin	P/S	P/S	P	P
	Measure of internal production cost without a profit margin	P/S	P/S	P	P
Pricing Practices	Two-part pricing	P/S	P/S	P	P
	Volume pricing	P/S	P/S	P	P
	Exclusive dealings	P/S	P/S	P	P
	Bundling	P/S	P/S	P	P

^aMethods of selling to consumers are excluded for food service and retail establishments.

Based on the results of the industry interviews and pretesting the data collection instruments, buyers and sellers of livestock and meat might use particular types of marketing arrangements for some of these general reasons:

- provides the ability to purchase at lower prices or sell at higher prices,
- reduces risk exposure,
- reduces costs of activities for buying and selling,
- reduces price variability,

Table 4-3. Key Terms of Alternative Marketing Arrangements^a

Cash market transactions specify provisions for only a few key terms in marketing arrangements, but the range of possible provisions in alternative marketing arrangements is extensive.

Term	Provisions in Cash Market Transactions	Range of Typical Provisions in Alternative Marketing Arrangements
Oral versus written	All oral	Either oral or written
Transportation—arrangement and payment	Seller arranges and pays if selling at auction; otherwise, might be arranged and paid for by either buyer or seller	Arranged and paid for by either buyer or seller
Time period in advance of delivery	Less than 2 weeks for livestock; less than 3 weeks for meat	Immediate to several days, weeks, or months
Contract duration	None specified	Might be single lot, multiple months, multiple years, or evergreen
Quantity requirements	None specified but may need sufficient livestock to fill a truck or meat to fill an order	Specified in the agreement but may allow variation
Quality requirements	None formally specified; based on judgment of buyer	Might require specific genetics, breed, certification, or grade of livestock or specific product weight, cut, trim, and other parameters for meat
Measurement of quality	Based on visual inspection	Based on carcass quality grading or measurement
Price determination method	Bidding process or individually negotiated	Might include individually negotiated prices or formula pricing with specified base price and premiums and discounts
Information provided back to seller	Usually none	Might include individual lot characteristics or individual animal characteristics
Dispute resolution	None specified	Specified in written agreements (usually arbitration); not specified in oral agreements
Termination options	None needed	Might require 1- or 2-year notice by either buyer or seller

^aTerms of hog production contracts and custom feeding arrangements for beef cattle and lambs are excluded from this table because they contain several other dimensions.

- reduces potential liability and litigation concerns,
- increases supply chain information,
- ensures higher-quality livestock or meat, or
- facilitates or increases market access.

Buyers or sellers that use *only the cash or spot market* might do so for one or more of the following reasons in addition to some of the reasons above:

- allows for adjusting operations quickly in response to changes in market conditions;
- does not require identifying and recruiting long-term contracting partners;
- does not require managing complex and costly contracts;
- eliminates possible negative public perceptions about use of contracts;
- allows for independence, complete control, and flexibility of own business; or
- enhances ability to benefit from favorable market conditions.

Table 4-4a provides the combined list of reasons why market participants might use only the cash or spot market and a preliminary explanation of why that reason might apply to particular buyers and sellers. In contrast, buyers or sellers that use *alternative marketing arrangements* (either solely or in conjunction with the use of cash or spot markets) might do so for one or more of the following reasons in addition to some of the general reasons noted above:

- allows for product branding in retail sales,
- allows for food safety and/or biosecurity assurances,
- allows for product traceability,
- improves week-to-week production management,
- improves efficiency of operations due to animal or product uniformity,
- reduces investment requirements for facilities and equipment,
- reduces operative capital requirements,
- secures a buyer for livestock or meat products,
- provides detailed carcass data back to the producer, or
- enhances access to credit.

Table 4-4a. Possible Reasons for Using the Cash or Spot Market

In the industry surveys to be administered in later parts of the study, we ask respondents who use only the cash or spot market for purchases or sales to indicate the top three reasons why they use only the cash or spot market.

Possible Reasons Why Buyers or Sellers Might Use <i>Only</i> the Cash or Spot Market for Exchanging Livestock or Meat Products	Why These Reasons Might Apply to Particular Buyers or Sellers
Possible Reasons Common to All Marketing Arrangements	
Can purchase livestock/meat products at lower prices or can sell livestock/meat at higher prices	Buyers of the product believe they pay lower prices for product than if they use an alternative marketing arrangement, and sellers of the product believe they receive higher prices for product than if they use an alternative marketing arrangement.
Reduces risk exposure	Buyers or sellers believe they are exposed to less revenue risk by using the cash or spot market.
Reduces costs of activities for buying/selling livestock/meat products	Buyers or sellers spend less labor time to conduct transactions. Labor time might include the time needed to become familiar with alternative marketing arrangements.
Reduces price variability for livestock/meat products	Buyers or sellers believe that prices paid or received are more stable when using the cash or spot market.
Reduces potential liability and litigation concerns	Buyers or sellers believe that the risk of liability or litigation issues is less if they use the cash or spot market.
Increases supply chain information	Buyers believe they obtain more information about the products they are buying, and sellers believe they provide more information about the products they are selling by using the cash or spot market. Increased information might affect product quality.
Ensures higher-quality livestock/meat products	Buyers believe they obtain higher-quality products, and sellers believe they can provide higher-quality products by using the cash or spot market.
Facilitates (allows) or increases market access	Buyers and sellers believe that using cash or spot markets increases availability of markets to themselves or to other buyers or sellers.
Possible Reasons Specific to Cash or Spot Markets	
Allows for adjusting operations quickly in response to changes in market conditions	Buyers and sellers believe the cash or spot market provides flexibility for them to adjust operations as they desire in response to current market conditions.
Does not require identifying and recruiting long-term contracting partners	Buyers and sellers do not have to expend resources required to find contracting partners.
Does not require managing complex and costly contracts	Buyers and sellers do not have to expend resources involved with managing contracts.
Eliminates possible negative public perceptions about use of contracts	Buyers and sellers do not have to contend with possible negative public perceptions in their communities related to using contracts.

(continued)

Table 4-4a. Possible Reasons for Use of the Cash or Spot Market (continued)

Possible Reasons Why Buyers or Sellers Might Use <i>Only</i> the Cash or Spot Market for Exchanging Livestock or Meat Products	Why These Reasons Might Apply to Particular Buyers or Sellers
Allows for independence, complete control, and flexibility of own business	Buyers and sellers maintain the ability to produce independently and sell when they want and how they want in the cash or spot market.
Enhances ability to benefit from favorable market conditions	Buyers can benefit from low cash or spot market prices, and sellers can benefit from high cash or spot market prices, rather than limiting prices to prenegotiated formulas or fixed prices.

In the industry surveys that will be conducted for later parts of the study, we will obtain data from survey respondents indicating which of these reasons for use are most important.

Table 4-4b provides a combined list of reasons that market participants might use alternative marketing arrangements and a preliminary explanation of why those reasons might apply to particular buyers and sellers. In the industry surveys that will be conducted for later parts of the study, we will obtain data from survey respondents on the relative importance of these reasons. However, in the sections below, we describe preliminary evidence based on discussions with industry participants.

In the remaining sections, we expand on the general information presented above to provide specific descriptions for each species and meat type and for downstream market participants.

Table 4-4b. Reasons for Using Alternative Marketing Arrangements

In the industry surveys to be administered in later parts of the study, we ask respondents who use alternative marketing arrangements for purchases or sales (solely or in conjunction with the cash or spot market) to indicate the top three reasons why they use those alternatives.

Reasons Why Buyers or Sellers Use Alternative Methods for Exchanging Livestock or Meat Products	Why These Reasons Might Apply for Particular Buyers or Sellers
Possible Reasons Common to All Marketing Arrangements	
Can purchase/sell livestock or meat products at lower/higher prices	Buyers of the product believe they pay lower prices for product, and sellers of the product believe they receive higher prices for the product than if they use the cash or spot market.
Reduces risk exposure	Buyers or sellers believe they are exposed to less revenue risk by using alternative marketing arrangements instead of the cash or spot market.
Reduces costs of activities for buying/selling livestock/meat products	Buyers or sellers spend less labor time to conduct transactions under an alternative marketing arrangement compared to the cash or spot market.
Reduces price variability for livestock/meat product inputs/output	Buyers or sellers believe that prices paid or received are more stable when using alternative marketing arrangements.
Reduces potential liability and litigation concerns	Buyers or sellers believe that the risk of liability or litigation issues is less if they use alternative marketing arrangements.
Increases supply chain information	Buyers believe they obtain more information about the products they are buying, and sellers believe they can provide more information about the products they are selling using alternative marketing arrangements. Increased information might affect product quality.
Ensures higher-quality livestock/meat products	Buyers believe they obtain higher-quality products, and sellers believe they provide higher-quality products by using alternative marketing arrangements.
Facilitates (allows) or increases market access	Buyers and sellers believe that alternative marketing arrangements increase the availability of markets to themselves or to other buyers or sellers.
Possible Reasons Specific to Alternative Marketing Arrangements	
Increases flexibility in responding to consumer demand	Buyers and sellers believe that alternative marketing arrangements allow them to meet consumer demand for particular types and quality of products.
Allows for product branding in retail sales	Buyers and sellers believe that alternative marketing arrangements allow them to maintain information required to label meat products with brand name labels.
Allows for food safety and biosecurity assurances	Buyers and sellers believe that alternative marketing arrangements allow them to ensure food safety or biosecurity of products.
Allows for product traceability	Buyers and sellers believe that alternative marketing arrangements allow exchange of information required for product traceability.

(continued)

Table 4-4b. Reasons for Using Alternative Marketing Arrangements (continued)

Reasons Why Buyers or Sellers Use Alternative Methods for Exchanging Livestock or Meat Products	Why These Reasons Might Apply for Particular Buyers or Sellers
Improves week-to-week production management	Buyers are able to purchase required inputs on a weekly basis, and sellers are able to sell products produced on a weekly basis. Thus, buyers and sellers can use productive capacity efficiently.
Improves efficiency of operations due to animal/product uniformity	Buyers are able to obtain uniform livestock or products by using alternative marketing arrangements, thus allowing for lower-cost operation of facilities.
Reduces investment requirements for facilities and equipment	Alternative marketing arrangements allow for provision of some of the facilities and equipment needed to operate the establishment.
Reduces operating capital requirements	Alternative marketing arrangements reduce the amount of cash required for the owner or manager to operate the establishment on a daily basis.
Secures a buyer for livestock/meat products	Alternative marketing arrangements secure a buyer for livestock or meat so that the seller does not need to expend resources on a periodic basis to find a buyer.
Provides detailed carcass data	The buyer receives and the seller provides detailed information about carcasses from livestock slaughtered by the establishment through the use of alternative marketing arrangements.
Enhances access to credit	Sellers are able to obtain financing for operation of facilities because they have ensured a market for their products through the use of alternative marketing arrangements.

4.2 FED CATTLE AND BEEF PRODUCERS AND PACKERS

The beef industry is the largest livestock and meat production industry in the United States. The industry comprises a large number of interrelated sectors that encompass numerous producers, stockers, feedlots, packers, processors, distributors, retailers, and exporters across a large number of geographic locations. There is considerable flexibility as to which elements of the system are used in the production of beef from a given animal. Animals are in the production system for 18 to 24 months, live outdoors, consume large amounts of forage, are moved over large geographic distances, are grouped and regrouped with other animals, and have multiple owners.

The marketing and ownership of feeder and fed cattle are also complex. On one extreme, a single owner may raise a calf from birth, background the calf on owned pasture, feed the animal at an owned feedlot, slaughter and process the animal in an owned processing facility, and sell the meat through an owned retail outlet. More commonly, an animal will be marketed two to four times to different production operations with different owners and then sold at slaughter to a separately owned processing operation. It is also likely that an animal has multiple owners at a given stage of production and that ownership may carry downstream to the next production phase.

Traditionally, cattle were traded throughout the supply chain via spot market transactions. Increasingly, fed cattle are being exchanged through nonspot market arrangements.

Traditionally, cattle were traded throughout the supply chain via spot market transactions. Increasingly, fed cattle are being exchanged through nonspot market arrangements. These marketing arrangements take three forms:

- packer-owned cattle fed in packer-owned and commercial feed lots,
- fed cattle purchased by forward or basis contracts, and
- exclusive marketing and purchasing agreements for securing cattle.

Forward or basis contracts are transactions in which the ownership is transferred more than 14 days prior to slaughter. This contrasts to the cash market, which is defined as a transaction where the cattle are slaughtered at or within 14 days.

The traditional practice in the fed cattle market is for cattle to be delivered to the slaughter plant within 7 days of the sale. Cattle are typically slaughtered on the same day they arrive at the plant. All cattle are generally sold for delivery the following week. Cattle bought this week for delivery this week or next week are cash cattle. Any other cattle transactions outside the 14-day window are captive supplies.

Marketing agreements are agreements in which a cattle-feeding organization agrees to market animals to a specific packer and possibly even to a specific plant. Marketing agreement cattle are formula priced. Packers may have some partial ownership or capital commitment in the marketing agreement cattle. Packer-owned cattle are those for which the packer has 100 percent of the capital commitment in the animals.

In the sections below, we present the descriptive findings on type and classification of alternative marketing arrangements; terms used in alternative marketing arrangements; availability of alternative marketing arrangements; reasons for use of alternative marketing arrangements; and, finally, other information needed to understand marketing arrangements in the cattle and beef markets.

4.2.1 Identification and Classification of Spot and Alternative Marketing Arrangements in the Fed Cattle and Beef Industries

Table 4-5 provides the types of cattle and beef products sold and the types of buyers for each. Production of slaughter-ready cattle generally involves several production stages, including cow-calf, backgrounding, and finishing. Commercial cow-calf producers typically maintain beef cows and their calves until weaning on grazed and harvested forages. Each cow usually produces one calf per year. Weaned calves are sold at an age of 5 to 10 months. The marketed weaned calves are then backgrounded, which refers to a postweaning growing period. Animals are then sold or placed in a feedlot and fed a high-energy ration for 4 to 6 months. The length of the feeding period depends on the cost of feed, the price of fed animals, the premiums or discounts associated with meat quality, and the size of the animal entering the feedlot. Fed cattle are then sold or transferred to a packing plant. The majority of beef processing occurs at the same location as the packing plant, but beef carcasses, quarters, primal cuts, subprimal cuts, and ground beef might also be shipped to a separate location for fabrication or further processing. Once beef products are produced, the general categories of products and buyers of those products are similar to the other meats.

For beef producers, backgrounders/stockers, and feedlots, the types of sales (or transfer) transactions are as follows:

- weaned calves to backgrounders/stockers,
- feeder cattle to feedlots, and
- fed cattle to packers for slaughter.

Figure 4-1 illustrates the types of marketing arrangements used for sales or transfers of feeder and fed cattle. The key dimensions of marketing arrangements at each stage include the **ownership method** for the animal or product while it is at

Table 4-5. Animals and Products Traded in the Beef Industry

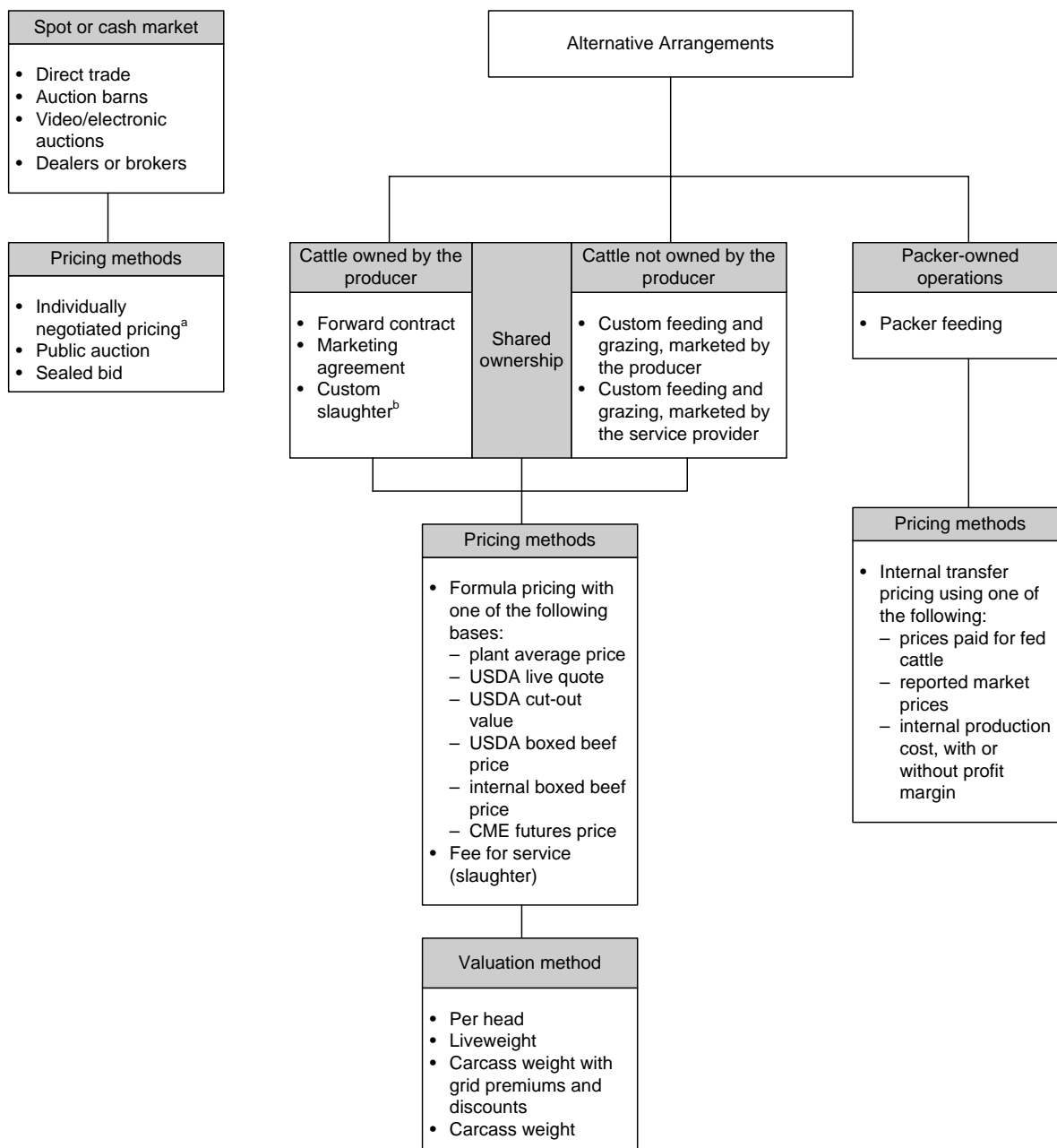
Four general ages of cattle and various beef products are traded in the industry.

Animal or Product	Buyer(s)
Weaned calves	Backgrounding operation Preconditioning (stocker) operation
Stocker or feeder cattle	Backgrounding operation Preconditioning (stocker) operation
Feeder cattle	Feedlot operation Custom cattle-feeding operation Packer for custom feeding
Fed or finished cattle	Packer Processor
Beef carcasses and quarters Beef primal cuts Beef subprimal cuts	Processor/grinder Wholesaler Exporter Food service operator Grocery retailer
Ground beef	Processor Wholesaler Exporter Food service operator Grocery retailer
Beef portion cuts Fresh processed beef Ready-to-eat (RTE) beef	Wholesaler Exporter Food service operator Grocery retailer
Case-ready beef	Wholesaler Exporter Grocery retailer

the feedlot (e.g., cattle owned by the producer or owner of the feedlot, jointly owned by the producer and packer, and packer owned) and the **pricing method** used. If formula pricing is used, a **formula base price** must also be specified. The **valuation method** for carcasses might be on a per-head basis, liveweight basis, or carcass weight basis or on the accumulated value of individual cuts. Carcass weight valuation methods may also incorporate a grid that offers premiums or discounts based on carcass grade classifications. Premiums and discounts may change weekly based on supply and demand conditions or may be fixed for some period. If animals or products are shipped from one establishment to another owned by the same

Figure 4-1. Marketing Arrangements for Sale or Transfer of Feeder and Fed Cattle by Beef Producers

Different types of pricing methods are associated with each type of marketing arrangement used in the industry.



^aIndividually negotiated pricing is often benchmarked against reported prices.

^bCustom slaughter may be coordinated by a cooperative for its producer members.

The types of buying and selling mechanisms vary by stage of the beef production system.

company, an **internal transfer pricing method** must also be specified.

The types of buying and selling mechanisms vary by stage of the beef production system. Many calves and stocker cattle are bought and sold through auction or sale barns. In particular, small producers extensively use these means. Also, dealers purchase small groups of cattle to be transported, aggregated, and resold to stocker and backgrounding operations. Direct trade occurs between larger cow-calf producers and larger backgrounding operations and feedlots. Direct trade also occurs between these larger operations and order buyers and dealers. Some backgrounding operations contract with feedlots to purchase calves to be grown and supplied to feedlots.

Stocker and feeder cattle tend to be direct traded, although some are marketed through public auctions. Buyers that work for operations downstream or intermediaries purchase smaller groups of cattle for aggregation into pens and delivery to feedlots. Video auctions are used somewhat in trading calves, stocker cattle, and feeder cattle. Use of video auctions reduces transportation and transactions costs, especially in the western United States.

Fed cattle are sold predominately via direct trade. Feedlot and processing operations negotiate prices of individual pens of cattle as well as negotiate long-term transactions that include forward contracts, formula contracts, and marketing agreements. Forward contracts appear to be used extensively, but not predominantly, within the cattle and beef markets. They allow both parties to lock in a price when they expect market changes.

Within cattle production, calf producers appear to make the largest use of forward contracts. Typically, calf producers sell many animals in one specific period, and forward contracts allow them to manage risk. Fed-cattle producers also use forward contracts, and some large packers forward contract more fed-cattle procurement than others. Many forward contracts employ a base price in which the contract price is related to the CME live cattle futures price closest to the date of exchange. This allows both parties to separately lock in prices on the CME by taking opposite positions. In this case, both parties assume basis risk. Other forward contracts are flat price contracts in which one party assumes the basis risk and

receives a premium for assuming this additional risk. Frequently, the buyer under the flat price contract is offsetting market price risk in the futures market.

The lengths of forward contracts are generally from 1 month to 1 year in the cattle sector. Some cow-calf operations will forward contract the sale of some portion of their calf crop after the calves are born, typically during the spring or summer. Multiple-year contracts are not typical. Cattle feeding operations tend to forward contract animal sales after the feeder cattle are placed on feed. This is usually 2 to 6 months prior to marketing. However, some contracts are very long in length, for example, some dairy animals, which are fed 18 to 20 months, are done so under contract.

Marketing agreements that incorporate some type of pricing method are one of the most important marketing methods for fed cattle and beef transactions.

Marketing agreements that incorporate some type of formula pricing method are one of the most important marketing methods for fed cattle and beef transactions. This method appears to be the second most important method behind cash market transactions. Businesses that use marketing agreements for fed-cattle transactions appear to be some of the largest and market the majority of fed cattle through these agreements. Under marketing agreements, cattle feeders and packers agree to trade animals on feed and price those animals using a formula.

Formulas tend to be based on USDA-reported live animal prices with premiums and discounts for carcass characteristics.

Formulas tend to be based on USDA-reported live animal prices with premiums and discounts for carcass characteristics. Formulas are also based on the

- USDA-reported boxed beef price,
- plant average prices paid by the packer for other fed cattle, and
- boxed beef or beef product prices internal to the processing firm.

Marketing agreements are negotiated periodically, may be written contracts but are often oral agreements, and tend to have very long durations. Both parties generally perceive benefits to participating in the agreements and maintaining long-term relationships.

Formula pricing downstream in the beef sector tends to not be associated with formal marketing agreements. Rather, quantities and time periods are agreed on and prices are determined by a formula. The formula is usually negotiated

A significant number of profit-sharing arrangements are used in the beef industry.

with premiums and discounts paid relative to some third-party reported price. These appear to be *de facto* marketing agreements in that smaller retailers and restaurants tend to trade predominantly with one firm for a given product.

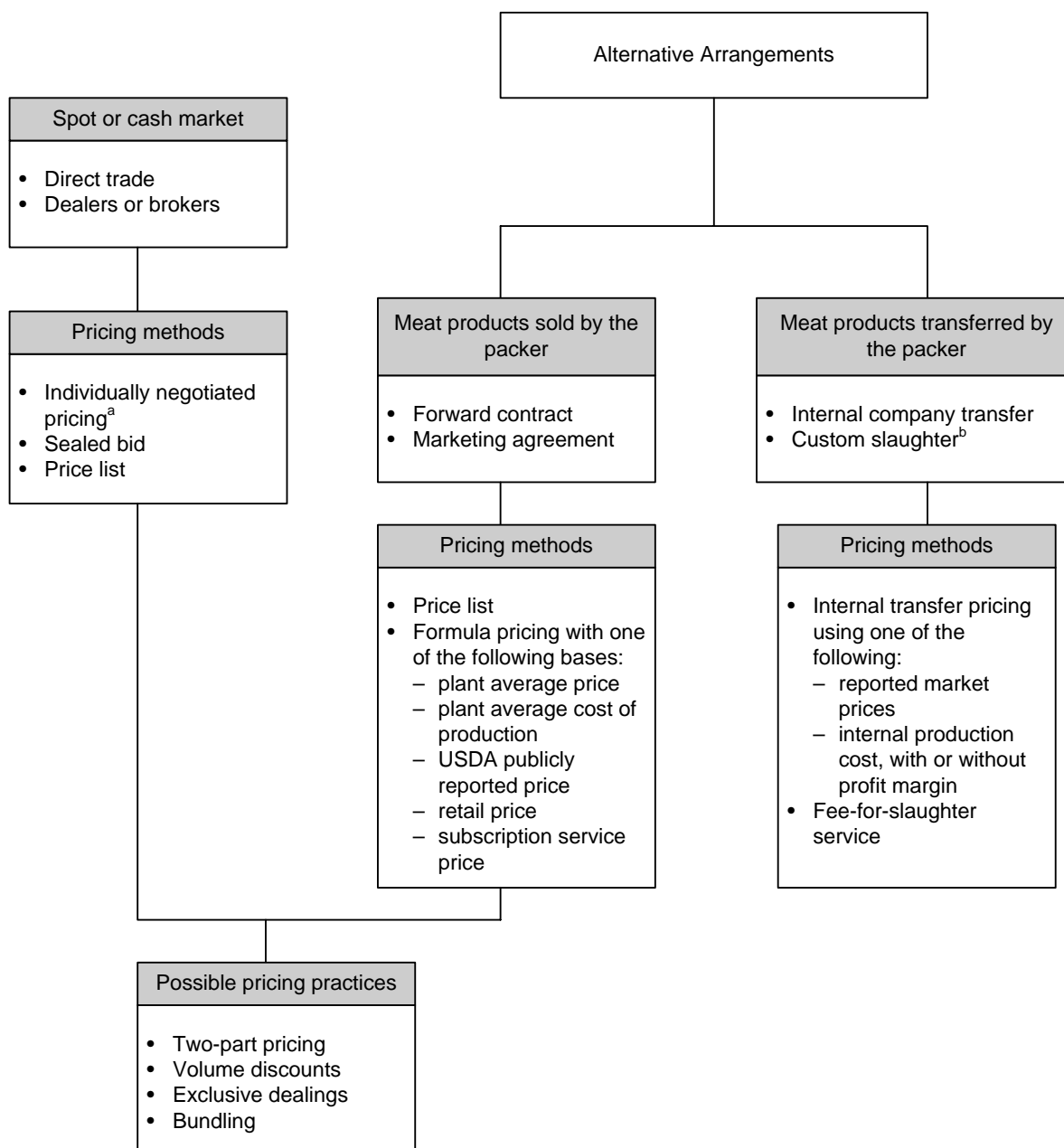
A significant number of profit-sharing arrangements are used in the beef industry. These appear to be primarily between feeding operations and packing operations. Packers own some share of a percentage of cattle on feed within a lot; for example, a packer may own a 50 percent interest in 25 percent of the animals in a lot. Generally, there is a marketing agreement in place specifying that animals will be shipped to the packer with the ownership interest and that the packer receives a portion of the feeding profits or losses.

In a profit-sharing arrangement, the packer, as partial owner, pays a transfer price for the feeder cattle and a portion of the feed expenses. The feedlot (or the cattle owners if different from the feedlot) is also subject to the feeding expenses. The cattle owner retains partial ownership of the animals throughout the meat production stage and receives a portion of the meat sales revenue, less the operating expenses of the processing facility. In this situation, the feedlot has incentives to engage in production practices with the animal that maximize meat sales revenue and to work with the packer to minimize operating expenses. Likewise, the packer has incentives to minimize feeding costs and other operating expenses at the feedlot within the context of making sure the cattle meet beef product needs and specifications.

Figure 4-2 illustrates the types of marketing arrangements used for sales or transfers of all types of meat products (including beef) by packers. Under alternative marketing arrangements, meat products might be sold by the packer or transferred to another establishment owned by the same company or to the owner of the livestock if custom slaughtered. Spot or cash market sales of meat are primarily conducted via individual negotiations. Transactions may be for very large or very small volumes and may be for carcasses, single cuts, or a variety of cuts. Sales representatives usually start negotiations for individual cuts based on a price list and usually must meet sales quotas. Listed prices are discounted if inventories of that cut are plentiful. Cuts will be deeply discounted if the fresh meat is held close to 13 days because product older than 13

Figure 4-2. Marketing Arrangements for Sale or Transfer of Meat Products from Packers

Meat products are sold or transferred to processors, wholesalers, exporters, food service operators, or grocery retailers.



^aIndividually negotiated pricing is often benchmarked against reported prices.

^bCustom slaughter may be coordinated by a cooperative for its producer-members.

days is difficult to market before spoiling. Retailers and other purchasers start negotiations with a price list and a volume of needs. Other pricing practices used for meat products might include two-part pricing, volume discounts, exclusive dealings, and bundling.

4.2.2 Terms, Availability, and Reasons for Use of Spot and Alternative Marketing Arrangements in the Fed Cattle and Beef Industries

As listed in Section 4.1, several types of key terms define marketing arrangements used in the livestock and meat industries. Below, we describe methods of pricing cattle and preliminary findings regarding the reasons for using alternative marketing arrangements for sales of feeder cattle, fed cattle, and beef products.

Liveweight and Dressed Weight Pricing of Cattle¹

The most common method of pricing fed cattle is based on liveweight.

The most common method of pricing fed cattle is based on liveweight. The cattle feeding operation and the meatpacking operation negotiate a price for the animal, group of animals, pen, or pens, and the packer pays the cattle feeder that price times the total liveweight of the animals involved. In some regions of the country, reducing the quantity sold by a percentage “pencil-shrink” is common. A second method is pricing based on dressed weight or carcass weight, sometimes referred to as “in-the-beef” pricing. The cattle feeder is paid based on the total dressed weight of the animals involved.

This section discusses the general pricing process packers follow in determining bid prices for fed cattle and the steps followed in pricing based on liveweight and dressed weight. Even if packers do not follow these exact steps, the incentives in the marketplace will result in prices that mirror this process.

General Pricing Process. In concept, beef packers estimate the value of beef and by-product sales and subtract slaughtering-fabricating costs and a target profit, and the remainder is the breakeven cattle purchase price where the breakeven includes an economic return. All packers begin with a basic economic concept, that profit (Eq. [4.1]) is total revenue minus total costs:

¹The discussion in this section uses material from Ward, Schroeder, and Feuz (2001a).

$$\text{Profit} = \text{Total Revenue} - \text{Total Costs} \quad (4.1)$$

Total revenue per head is the sum of beef and by-products sales. Total costs per head are all costs related to purchasing fed cattle and slaughtering-fabricating. Therefore, Eq. (4.2) is simply an expanded version of Eq. (4.1).

$$\begin{aligned} \text{Profit/Head} = & \{[(\text{Price}_{\text{Boxed Beef}} \times \text{Quantity}_{\text{Boxed Beef}}) + \\ & (\text{Price}_{\text{By-products}} \times \text{Quantity}_{\text{By-products}})] - \\ & [(\text{Price}_{\text{Fed Cattle}} \times \text{Quantity}_{\text{Fed Cattle}}) + \\ & \text{Costs}_{\text{Slaughtering-Fabricating}}]\} / \text{Quantity}_{\text{Fed Cattle}} \quad (4.2) \end{aligned}$$

The expression $[(\text{Price}_{\text{Boxed Beef}} \times \text{Quantity}_{\text{Boxed Beef}}) + (\text{Price}_{\text{By-products}} \times \text{Quantity}_{\text{By-products}})]$ is the total revenue from beef and by-products sales. The expression $[(\text{Price}_{\text{Fed Cattle}} \times \text{Quantity}_{\text{Fed Cattle}}) + \text{Costs}_{\text{Slaughtering-Fabricating}}]$ is the total cost for purchasing fed cattle and for slaughtering-fabricating.

The bid price is estimated as total revenue from beef and by-products minus the cost of slaughtering-fabricating and a profit target.

In determining the bid price for fed cattle, packers rearrange the profit equation into a bid price equation. The bid price is estimated as total revenue from beef and by-products minus the cost of slaughtering-fabricating and a profit target, all divided by the quantity (or weight in this case) of fed cattle purchased (Eq. [4.3]).

$$\begin{aligned} \text{Bid Price}_{\text{Fed Cattle}} = & [(\text{Price}_{\text{Boxed Beef}} \times \text{Quantity}_{\text{Boxed Beef}}) + \\ & (\text{Price}_{\text{By-products}} \times \text{Quantity}_{\text{By-products}}) - \\ & \text{Cost}_{\text{Slaughtering-Fabricating}} - \text{Profit Target}] / \\ & \text{Quantity}_{\text{Fed Cattle}} \quad (4.3) \end{aligned}$$

This is a general bid price in that it does not address a number of important factors in cattle pricing. It is not yet specific to the pricing method nor to individual pens of cattle. However, it is representative of general market conditions and pricing behavior.

Liveweight Pricing Process. Packer pricing of fed cattle is a two-stage process. In the first step, a head buyer determines a weekly buy order. While indicated here that the buy order lasts a week, in fact, it may change during the week, depending on market conditions. There also may be daily buy requirements, and the weekly order is balanced with deliveries of forward bought cattle and marketing agreement cattle. The buy order is

given to field-level buyers, and they execute the buy order as they purchase fed cattle from feedlots.

In general, the first stage is similar to Eq. (4.3). Inserting some realistic values for each variable in the right-hand side of Eq. (4.3), we can estimate a bid price. Prices are in dollars per hundredweight and quantities are in per-head units. The example assumes that a 1,200-pound animal yields 762 pounds of meat, or dresses at 63 percent. The example uses the following assumed values: the boxed beef price is \$130 per cwt dressed, by-products value is \$8.00 per cwt liveweight, slaughtering-fabricating cost is \$120 per head, and the profit target is \$15 per head.

$$\begin{aligned}
 \text{Bid Price} &= [(\$130)(7.62 \text{ cwt}) + (\$8.00)(12 \text{ cwt}) - \\
 &\quad \$120 - \$15] / 12 \text{ cwt} \\
 &= [\$982.80 + \$96 - \$120 - \$15] / 12 \text{ cwt} \\
 &= \$78.65/\text{cwt}
 \end{aligned} \tag{4.4}$$

To this point, the above approach approximates the process followed by the head buyer in determining how much buyers can pay on average for fed cattle. The actual bids made will be below this target-profit breakeven price.

However, there are quality variations in cattle; thus, fed-cattle bids need to be adjusted to consider quality variation. Table 4-6 shows the step-by-step process of developing a bid price for fed cattle based on liveweight.

Step 1: Packers begin by estimating the boxed beef price, assumed here to be \$130 per cwt dressed. They compute an adjusted boxed beef price that accounts for cattle quality differences from the base type, assumed here to be Choice quality grade, YG 1–3, with 750- to 900-pound carcasses. The cattle are estimated to be 50 percent Choice quality grade (50 percent Select); 90 percent, YG 1–3 (10 percent YG 4–5); and 10 percent heavier than 750 to 900 pounds. The Select price discount or the Choice-Select price spread is \$6 per cwt, the YG 4–5 discount is \$15 per cwt, and the discount for carcasses above the 750- to 900-pound range is \$20 per cwt. For simplicity, we are assuming that there are no light cattle and carcasses.

Table 4-6. Liveweight Price Bid Example

In this example, the opening bid price for liveweight pricing takes into account the boxed beef price, by-product values, and processing costs (with profit target) per cwt liveweight.

For cattle weighing 1,200 lbs—		
▪ STEP 1: Compute Adjusted Boxed Beef Price		
"Projected" Boxed Beef Price (Choice YG 1-3, 750-900)		\$130.00
Less Discounts:		
% Select x \$ Discount	(50% x \$6)	-\$3.00
% YG 4-5 x \$ Discount	(10% x \$15)	-\$1.50
% Light/Heavy x \$ Discount	(10% x \$20)	-\$2.00
Sum for Adjusted Boxed Beef Price		\$123.50
▪ STEP 2: Convert Boxed Beef Price to Liveweight		
Adjusted Price x Dress %	(\$123.50 x 63%)	\$77.805
▪ STEP 3: Add By-products Value		
Step 2 + \$8.00/liveweight cwt	(\$78.805 + \$8.00)	\$85.805
▪ STEP 4: Subtract Processing Costs Plus Profit Target		
\$120/Head Cost (Slaughtering-Fabricating) + \$15/Head Profit Target = \$135/Head ÷ 12 cwt	(\$85.805 - \$11.25)	\$74.555
Opening Bid Price		\$72.50/cwt

Source: Based on Ward, C.E., T.C. Schroeder, and D.M. Feuz. 2001b. "Fed Cattle Pricing: Formulas and Grids." Extension Facts WF-557. Stillwater, OK: Oklahoma Cooperative Extension Service, Oklahoma State University.

Step 2: The dressed weight-adjusted boxed beef price is converted to a liveweight price by multiplying by the expected dressing percentage.

Step 3: By-products value, usually quoted on a liveweight basis, is added to the adjusted price from Step 2.

Step 4: The final step is to subtract slaughtering-fabricating costs plus a profit target. The long-run average profit in meatpacking is 1 to 2 percent return on sales, which in this case is about \$15 per head.

Note that the estimated bid price in Table 4-6 differs from the estimated price in Eq. (4.4) because the estimate from Eq. (4.4) assumed all cattle met the base or standard type. Since the pen of cattle for which the price was estimated was not 100 percent Choice grade, 100 percent YG 1-3, and 100

percent 750 to 900 pounds, the estimated price in Table 4-6 was lower.

With liveweight pricing, packers typically pay transportation costs from the feedlot to the packer but take an industry standard 4 percent pencil-shrink on the feedlot weight of the cattle.

Often when a particular feedyard offers a large number of cattle in a single transaction, the packer buyer may bid on the entire lot at the same price to save time and costs associated with cattle procurement, even though individual pen and animal values differ. The feedlot marketing a large number of cattle on a liveweight basis has a similar incentive to market a large portion of the showlist to a single buyer in one transaction.

Because meat quality and carcass dressing percentage are difficult to accurately predict on live animals, premiums and discounts paid on a live basis are generally not reflective of the true cattle value associated with the final product yield and quality.

Pricing cattle on a liveweight basis is appealing to some cattle feeders who want to maintain complete flexibility in cattle pricing until the transaction price is established. However, because meat quality and carcass dressing percentage are difficult to accurately predict on live animals, premiums and discounts paid on a live basis are generally not reflective of the true cattle value associated with the final product yield and quality. In other words, high-quality cattle are often undervalued and low-quality cattle are often overvalued.

Dressed Weight Pricing Process. The process for developing a bid price based on dressed weight is very similar to the process for developing a bid price based on liveweight. Table 4-7 shows the step-by-step process with the same assumptions as in the liveweight example.

Step 1: This first step is exactly the same as before.

Step 2: Step 2 in this example differs because the previous Step 2, conversion to a liveweight basis, is not necessary for pricing on a dressed weight basis. Step 2 in this example is really Step 3 in the previous example with one exception. The by-products value must be converted to a dressed weight basis before adding it to the adjusted price from Step 1.

Step 3: Step 3 differs from the last step before only in that slaughtering-fabricating costs and the profit target are converted to a dressed weight basis before subtracting them from the Step 3 amount.

Table 4-7. Dressed Weight “in the Beef” Price Bid Example

In this example, the opening bid price for dressed weight pricing takes into account the boxed beef price, by-product values, and processing costs (with profit target) per cwt dressed weight.

For cattle weighing 1,150 lbs—			
▪ STEP 1: Compute Adjusted Boxed Beef Price			
“Projected” Boxed Beef Price (Choice YG 1–3, 700–850)			\$130.00
Less Discounts:			
% Select x \$ Discount	(50% x \$6)		–\$3.00
% YG 4–5 x \$ Discount	(10% x \$15)		–\$1.50
% Light/Heavy x \$ Discount	(10% x \$20)		–\$2.00
Sum for Adjusted Boxed Beef Price			\$123.50
▪ STEP 2: Add By-products Value (on a dressed weight basis)			
Step 1 + By-products value/liveweight cwt ÷ Dress % [\$123.50 + (\$8 ÷ .63)] = (\$123.50 + \$12.70)			\$136.20
▪ STEP 3: Subtract Cost Plus Profit Target (on a dressed weight basis)			
\$120/Head Cost (Slaughtering-Fabricating) + \$15/Head Profit Target = \$135/Head ÷ 7.56 cwt		(\$136.20 – \$17.86)	\$118.34
Opening Bid Price			\$116.75/ dressed cwt

Source: Based on Ward, C.E., T.C. Schroeder, and D.M. Feuz. 2001a. “Fed Cattle Pricing: Live and Dressed Weight.” Extension Facts WF-556. Stillwater, OK: Oklahoma Cooperative Extension Service, Oklahoma State University.

Dressed weight pricing eliminates the risk to the feeder and to the packer of the packer incorrectly estimating the dressing percentage.

With dressed weight or “in-the-beef” pricing, payment is made based on the actual “hot” (before chilling) carcass weight. Cattle feeders typically pay transportation costs from the feedlot to packing plant. Dressed weight pricing eliminates the risk to the feeder and to the packer of the packer incorrectly estimating the dressing percentage. Dressed weight prices on average should, therefore, be higher than liveweight prices, and research has supported that hypothesis (Feuz, Fausti, and Wagner, 1993). To compensate for errors in estimating dressing percentages, packers bid slightly lower on liveweight bids compared with dressed weight bids.

The incentives for packers to buy complete showlists and feedlots to sell complete showlists at one dressed weight price are the same as for liveweight pricing. This practice reduces costs associated with procurement for the packers and

marketing for the feedlots. However, dressed weight pricing distorts market signals and tends to reward inferior cattle and penalize superior cattle by trading all cattle at one average price.

Formula and Grid Pricing for Cattle²

This section discusses formula or grid pricing, gives examples, and discusses some of the issues surrounding formula pricing. Grid pricing, in part, addresses the problem of pricing efficiency at the industry level; however, other issues emerge with grid pricing.

Formula and Grid Pricing. Formula pricing need not be based on a grid, but grid pricing is usually based on a formula. Packers state that they have used price grids for years. However, in the examples presented, some differences will be noted between what packers used for years and what they are using today. Most marketing agreements and strategic alliances use some type of formula or grid pricing method.

With most formulas and grids, price is discovered after animals have been slaughtered.

With most formulas and grids, price is discovered after animals have been slaughtered. There may be a few exceptions, but most formulas and grids are based on dressed weights for fed cattle. Unlike liveweight pricing or dressed weight pricing, a price is discovered for each animal rather than simply one average price for the entire quantity sold. As a result, higher-quality cattle receive higher prices, and lower-quality cattle receive lower prices, thereby improving pricing efficiency—pricing the raw material based on its value—and rewarding producers who market desirable types of cattle.

Most formulas and grids consist of a base price with specified premiums and discounts for carcasses above and below the base or quality specifications.

Most formulas and grids consist of a base price with specified premiums and discounts for carcasses above and below the base or quality specifications. The price is a formula price in that there is no negotiation during the transaction. The price is based off some third-party or other price, and the formula is what is negotiated but only infrequently. Premiums and discounts might be based on plant averages or on reported premiums and discounts or they might be negotiated.

Grid Pricing Example. Individual packers develop their own grids. The format in which they are presented may vary;

²The discussion in this section uses material from Ward, Schroeder, and Feuz (2001b).

Table 4-8 contains an example grid. It does not represent the grid for any specific packer, but it is representative. The developed grids that are used to buy cattle are related to but not necessarily exactly the same as those used in the selling of beef cuts. One of the problems with grids is that the term "grid" is used to describe many different things. Most grids are similar in concept but different in procedures.

Table 4-8. Example Beef Cattle Grid (\$/dressed cwt)

Adjustments are relative to Choice, YG 3 carcasses in the 600- to 900-pound range.

	Base Price Adjustment
Prime-Choice price spread	+\$12
Certified-Choice price spread	+\$5
Choice-Select price spread	-\$6
Select-Standard price spread	-\$15
Dark cutters	-\$25
Light carcasses (<600 lbs)	-\$15
Heavy carcasses (>900 lbs)	-\$15
YG 1	+\$5
YG 2	+\$3
YG 4	-\$12
YG 5	-\$18

Source: Based on Ward, C.E., T.C. Schroeder, and D.M. Feuz. 2001b. "Fed Cattle Pricing: Formulas and Grids." Extension Facts WF-557. Stillwater, OK: Oklahoma Cooperative Extension Service, Oklahoma State University.

The premiums and discounts in Table 4-8 can be put into a matrix format (Table 4-9). The term "grid" comes from the matrix framework of premiums and discounts for specified carcass characteristics.

Grids or formulas used in recent years differ from previous years in that premiums for higher-quality cattle are frequently larger than before.

For years, head buyers at meatpacking firms have developed a weekly buy order that is given to their field buyers to implement. The order resembles the sample grid in Table 4-8. Most packers paid only small premiums for higher-quality cattle and large discounts for lower-quality cattle. Grids or formulas used in recent years differ from previous years in that premiums for higher-quality cattle are frequently larger than before. Discounts for lower-quality cattle may still be larger than premiums for higher-quality cattle, but packers are sending clearer signals with the grids being used today than in previous years. Packers are communicating through price signals that they want higher-quality cattle because they cannot use or market lower-quality cattle.

Table 4-9. Example Beef Cattle Grid in a Matrix Format (\$/dressed cwt)

Premiums and discounts are relative to the base price for Choice, Yield Grade 3, 600 to 900 pounds.

Quality Grade	Yield Grade				
	1	2	3	4	5
Prime	—	—	+\$12	—	—
Certified program	—	—	+\$5	—	—
Choice	+\$5	+\$3	Base	-\$12	-\$18
Select	—	—	-\$6	—	—
Standard	—	—	-\$15	—	—
Dark cutter	-\$25				
Light carcasses (<600 lbs)	-\$15				
Heavy carcasses (>900 lbs)	-\$15				

Source: Based on Ward, C.E., T.C. Schroeder, and D.M. Feuz. 2001b. "Fed Cattle Pricing: Formulas and Grids." Extension Facts WF-557. Stillwater, OK: Oklahoma Cooperative Extension Service, Oklahoma State University.

Packer grids may identify additional premiums for carcasses meeting specifications of Certified Angus Beef (CAB) or other certified marketing programs. (CAB is the largest certified program.) A line for "certified program" is included in the grid example here. Likewise, packers may specify discounts for hide damage, injection site blemishes, condemnations, and other "outs" or unmarketable carcasses (in addition to discounts for dark cutters and light or heavy carcasses as shown in the sample grid).

Note that Table 4-9 has several empty matrix cells (e.g., for Prime, YG 1 cattle, and several other quality grade-yield grade combinations). If we assume that quality and yield grade premiums and discounts are additive, then we can complete the matrix in Table 4-9 as shown in Table 4-10. For example, the premium for Prime YG 1 carcasses is +\$17 per cwt, which represents a \$12 per cwt premium for Prime quality grade carcasses and a \$5 per cwt premium for YG 1 carcasses.

To compute a grid-based formula price, the distribution of carcasses by quality grades and yield grades from a sale lot of fed cattle must be known. That distribution also is put into a matrix framework. The hypothetical distribution of carcasses for a 100-head sale lot of steers is shown in Table 4-11. The hypothetical pen is a mix of many high-quality grade carcasses (80 percent Choice and Prime) and few low yield grade carcasses (30 percent YG 4s and 5s).

The grid price, with the formula price as the base, can be computed in one of two ways, both resulting in the same weighted average price for the sale lot, assuming quality grade and yield grade premiums and discounts are additive. For the example here, a base price of \$130 per cwt dressed weight is assumed.

- **Method I:** Base Price + (% of carcasses in each quality grade X each Choice-other grade premiums or discounts) + (% of carcasses in each yield grade X YG 3-other yield grade premiums or discounts) = \$127.03 per cwt.
- **Method II:** Base Price + (% of carcasses in each quality grade-yield grade cell X each quality grade-yield grade premium or discount) = \$127.03 per cwt.

In essence, the difference between Methods I and II is that Method I uses the incomplete matrix of Table 4-9 and only uses row and column totals in Table 4-11, while Method II uses the complete matrix of Table 4-10 and each matrix cell in Table 4-11. In both cases, it was assumed there were no "out" or ungraded carcasses.

Table 4-10. Example Beef Cattle Grid in a Completed Matrix Format (\$/dressed cwt)

Discounts and premiums for all possible combinations of yield grade and quality grade can be derived by adding up all possible discounts and premiums.

Quality Grade	Yield Grade				
	1	2	3	4	5
Prime	+\$17	+\$15	+\$12	0	-\$6
Certified	+\$10	+\$8	+\$5	-\$7	-\$13
Choice	+\$5	+\$3	Base	-\$12	-\$18
Select	-\$1	-\$3	-\$6	-\$18	-\$24
Standard	-\$10	-\$12	-\$15	-\$27	-\$33
Dark cutter	-\$25				
Light carcasses (<600 lbs)	-\$15				
Heavy carcasses (>900 lbs)	-\$15				

Source: Based on Ward, C.E., T.C. Schroeder, and D.M. Feuz. 2001b. "Fed Cattle Pricing: Formulas and Grids." Extension Facts WF-557. Stillwater, OK: Oklahoma Cooperative Extension Service, Oklahoma State University.

Table 4-11. Example Distribution of Beef Cattle Carcasses by Quality and Yield Grades (100 head total)

A hypothetical distribution of cattle in a lot can be used to illustrate the computation of a grid-based formula price.

Quality Grade	Yield Grade					Sum
	1	2	3	4	5	
Prime	1	2	2	4	5	14
Certified	1	2	3	4	6	16
Choice	2	12	29	5	2	50
Select	4	3	2	1	1	11
Standard	3	2	2	1	1	9
Sum	11	21	38	15	15	100

Source: Based on Ward, C.E., T.C. Schroeder, and D.M. Feuz. 2001b. "Fed Cattle Pricing: Formulas and Grids." Extension Facts WF-557. Stillwater, OK: Oklahoma Cooperative Extension Service, Oklahoma State University.

Plant Average Grid Price Example. The base price assumed in the above example was a dressed weight price. However, in several formulas, the base price is a plant average price.

In this example, we assume there are two packing plants each using a plant average base price in their formula price bids. Both may use the same beginning dressed weight cash price and the same Choice-Select price spread (Table 4-12). Assume the plant average base price is calculated on the basis of last week's slaughter results. Carcasses in Plant A last week averaged 60 percent Choice grade, better than carcasses in Plant B, which averaged 40 percent Choice.

Table 4-12. Plant Average Beef Grid Price Example (\$/dressed cwt)

Plants that receive lower-quality cattle in a given week will raise their base prices to provide an incentive to producers to provide higher-quality cattle in the following week.

	Plant A	Plant B
Dressed weight cash price	\$130.00	\$130.00
Choice-Select price spread	\$6.00	\$6.00
Plant average percent Choice	60%	40%
Plant average percent Select	40%	60%
Step 1: Compute the Choice-Select Price Spread Effect (Choice-Select price spread X plant average percent Select)	\$2.40	\$3.60
Step 2: Add the Choice-Select Price-Spread Effect (Dressed weight cash price + Choice-Select price spread effect)	\$132.40	\$133.60

Source: Based on Ward, C.E., T.C. Schroeder, and D.M. Feuz. 2001b. "Fed Cattle Pricing: Formulas and Grids." Extension Facts WF-557, Stillwater, OK: Oklahoma Cooperative Extension Service, Oklahoma State University.

Step 1 is to compute the effect from having less than 100 percent Choice carcasses. The Choice-Select price spread effect is greater for Plant B than Plant A because the quality of carcasses on average was lower for Plant B. Step 2 adjusts the dressed weight cash price by the Choice-Select price spread effect. The end result is the computed plant average base price. Other adjustments may be made, such as for Prime or Certified carcasses, YG 1 to 2 or 4 to 5 carcasses, or heavier or lighter carcasses.

Note that, in this example, the plant that had a greater percentage of lower-quality cattle the preceding week pays the highest base price. The higher base price communicates an incentive to ship higher-quality cattle to Plant B to bring the plant average up to or above its competitor's plant. If a cattle feeder knows how the cattle will grade on average, then the feeder can choose which plant will pay the highest base price. It is to the feeder's advantage to market cattle that will be better quality than the plant average to the plant that has the lowest plant average for the base price week and thus can pay the highest plant average base price.

Reasons for Using Alternative Marketing Arrangements

The major reasons for the shift to alternative marketing methods for cattle feeders or producers, packers, and even downstream participants are management of costs, supply, and risk.

Discussions revealed several themes regarding why market participants may or may not choose to use alternative marketing arrangements in addition to or in place of traditional spot market transactions. The major reasons for the shift to alternative marketing methods for cattle feeders or producers, packers, and even downstream participants are management of costs, supply, and risk. Some of the specific reasons noted by beef cattle producers for choosing to use alternative marketing agreements include

- guaranteed return of value on quality cattle,
- volume management and secured supply,
- assured quality attributes for specialized or branded programs,
- improved facility or capacity utilization,
- guaranteed financing or access to additional capital,
- enhanced risk management to help smooth the volatility of the market,
- enhanced business relationships,

Beef packers' motivations for using alternative marketing arrangements tend to focus on obtaining desired quantities and on satisfying customer demands for quality and consistency.

- enhanced downstream customer satisfaction,
- significant operational cost and time savings through forward purchases and sales, and
- price risk management.

Beef packers' motivations for using alternative marketing arrangements tend to focus on obtaining desired quantities and on satisfying customer demands for quality and consistency. Packers are also concerned with timing and scheduling issues. Specific reasons noted by beef packers included

- obtaining consistent quality fed cattle to provide more desirable products for retailers and food service operators, thereby promoting customer or product loyalty;
- allowing them to offer consistent prices and quality for retail products or food service menu items to reduce marketing costs and enhance customer satisfaction;
- allowing for volume management and secured supply;
- improving capacity utilization; and
- managing risk.

Several other attributes that have become extremely important to market participants and result in increased use of alternative marketing arrangements are health management, source verification, and animal history.

Several other attributes that have become extremely important to beef market participants and result in increased use of alternative marketing arrangements are health management, source verification, and animal history. This focus has proved to be cost-effective for participants and resulted in increased long-term returns and overall efficiency. Many packers described how these attributes require a secure supply or reliable source to maintain certain animal specifications.

Beef producers, feeders, and packers stated that in general alliances and cooperatives provide the following incentives:

- reduced marketing costs;
- guaranteed "hotel" for cattle;
- increased bargaining power, knowledge, and information when entering the market;
- management of production coupled with a focus on desired consumer values and product attributes; and
- the advantage of specialization.

Several industry participants stated that they choose not to enter into alternative marketing agreements for reasons that include

- the desire to maintain flexibility to manage a diverse portfolio of marketing methods,
- economic reasons such as higher returns or increased efficiency with cash or spot market transactions, and
- maintenance of relationships and a “handshake” mentality between industry participants.

Beef producers using alternative marketing arrangements tend to be large producers.

Beef producers using alternative marketing arrangements tend to be large producers. Large calf and feeder cattle producers appear to use forward contracting more extensively than small producers. Large feedlot operations tend to use more marketing agreements and formula pricing than smaller operations. This might suggest limitations in availability. However, potential benefits relative to the effort required to negotiate a contract vary with producer size. Therefore, one might expect smaller producers to use alternative marketing arrangements less frequently. Nevertheless, smaller producers willing to invest the effort appear to make frequent use of these arrangements.

Large packers seem to be motivated to use alternative marketing arrangements to maintain volumes and flows of animals, and small packers seem to be motivated to use alternative marketing arrangements to secure reliable supplies of specific quality animals.

Based on the interviews conducted for this portion of the study, there is insufficient information to determine the extent to which alternative marketing arrangements are more readily available to large producers. Further, the question of availability is affected by a variety of factors other than business size. However, packers appear to have “off-the-shelf” written contracts that are readily available to those who wish to use them.

Large beef packers seem to be motivated to use alternative marketing arrangements to maintain volumes and flows of animals, and small beef packers seem to be motivated to use alternative marketing arrangements to secure reliable supplies of specific quality animals. Small packer contracts appear to be more variable, having characteristics unique to the target market.

Overall, the main reason that firms appear to use alternative marketing arrangements is that these arrangements add to the portfolio of marketing opportunities.

Overall, the main reason that firms appear to use alternative marketing arrangements is that these arrangements add to the portfolio of marketing opportunities. Forward contracts and marketing agreements using formula pricing allow beef producers to sell using an alternative to the cash or spot market. Forward contracts are pursued to manage price risk and take advantage of perceived market opportunities. These are important alternatives to cash markets and allow for diversification of sales or purchases over time. The results of

the industry interviews indicate that the firms participating in alternative marketing arrangements do so by choice rather than by threat or perceived threat. Because of this, alternative marketing arrangements must be perceived to be providing benefits to industry participants relative to other available methods. However, it should be noted that, if there are many sellers in the market, each seller perceives that its own actions will not have a noticeable effect on market outcomes. Yet, as more sellers enter into contracts, entry may be deterred, and contracts may allow packers to keep prices below competitive levels, thereby causing sellers as a group to be worse off (MacDonald et al., 2004).

Furthermore, the formula price for all practical purposes ensures that firms marketing cattle through this method pay and receive a representative market price.

Another important reason that beef market participants enter into alternative marketing arrangements is to reduce transactions costs. Time devoted to negotiating and bargaining in the fed cattle market in particular is significant. Bargaining usually occurs for the first 3 to 4 days of the week with trades actually occurring on Thursday or Friday. However, the participant must be present and interact the entire week and be available for meetings and calls. The person involved in the bargaining process is usually a member of senior management. Marketing agreements using formula pricing allow the savings of 2 to 3 days per week for this individual. This can be a significant reduction in overhead expenses. Furthermore, the formula price for all practical purposes ensures that firms marketing cattle through this method pay and receive a representative market price. If formula prices are perceived to be out of balance with the market, then market participants have incentives for and have had instances of renegotiation.

The issue of whether a price is representative relates to whether the marketing method employed provides a payment that is equivalent to the risk-adjusted price determined in the cash market. Producers that focused on improving the efficiency of their operations wanted to be paid the market price for cattle. Both producers and packers are interested in formula arrangements that reduce transactions costs but incorporate payment schemes where formula prices are representative of prices in the cattle market. Producers and packers interviewed also believe that the cash market is not so thin as to be problematic for formula arrangements in terms of price discovery.

Firms using alternative marketing arrangements also have better knowledge of the performance of the animal in terms of meat quality and how that matches with characteristics desired by downstream buyers, and they are better able to focus procurement efforts on the type of inputs needed to achieve that end point.

Many firms that use alternative marketing arrangements are able to discuss and present evidence of reduced operating costs. Firms using alternative marketing arrangements also have better knowledge of the performance of the animal in terms of meat quality and how that matches with characteristics desired by downstream buyers, and they are better able to focus procurement efforts on the type of inputs needed to achieve that end point. They also know they have a buyer for the specific animal produced and are able to focus production processes on achieving the desired end point. Further, this focused production effort allows more efficient use of production resources. Improved capacity management compared to capacity management with cash markets reduces physical facility overhead expenses.

Alternative marketing arrangements are often used as a means to capture the full value of quality cattle.

Alternative marketing arrangements are often used as a means to capture the full value of quality cattle. Producers noted that value-added programs focused on health management and product differentiation (often of branded products). Various programs involving specific marketing efforts of quality cattle were worth premiums that could likely be accounted for in alternative marketing arrangements. Promising and producing higher-quality cattle often involve additional costs for which producers must be compensated. Guaranteed purchases and sales of value-added, program cattle promote supply management, enhance capacity utilization, and encourage the continued production of these cattle.

Alternative marketing arrangements in the beef industry often involve financial participation by the downstream buyer. The producer or feedlot is then able to expand production with the additional capital. The cost associated with the capital is simply shifted from the producer or feedlot to the downstream buyer, so there is likely no net gain to the industry from reduced capital costs. However, the individual incentive for the upstream producer or feedlot is substantial. The industry may experience a net gain if the cost of capital to the downstream buyer is less than the cost of capital to the upstream producer because of access to capital markets (the banker's transactions costs and profit margin are removed).

The alliance literature discusses the importance of increased bargaining power and supply chain cooperation, shared goals and information, coordination of activities, and satisfaction of

consumers. These desirable properties, or potential positive externalities, appear to be internalized within alternative marketing arrangements. For example, some arrangements have profit sharing between the different stages. This profit sharing internalizes incentives and allows the participating businesses to identify all the possible dimensions of production practices that maximize profits to the system. The inefficient practices within a system can thus be identified and avoided.

4.2.3 Summary Information about Marketing Behavior in the Fed Cattle and Beef Industries

Based on the discussion above, some of the unique characteristics of the fed cattle and beef industry are as follows:

- Industry procurement and sales practices vary significantly across the cow-calf, backgrounding, feeding, slaughter and processing, and downstream marketing levels as follows:
 - Forward contracting appears to be the most common alternative marketing arrangement at the cow-calf and backgrounding levels, but there are also some production contract-like arrangements at the backgrounding level.
 - Marketing agreements appear to be the most common alternative market arrangement at the feeding stage; these marketing agreements are priced largely using formula pricing.
 - Forward contracting with formula pricing appears to be the most common type of alternative marketing arrangement between packers and downstream buyers.
- Industry procurement and sales practices can be characterized as portfolios of various arrangements, including spot markets, marketing agreements, forward contracts, and custom feeding. The reasons for diversified procurement and sales portfolios include supply management, timing and scheduling maintenance, transactions cost reductions, operations cost reductions, quality assurances, risk management, and maintenance of trading flexibility.
- Market participants are shifting away from cash or spot market participation toward more mechanical types of marketing arrangements with unknown effects on markets for producers, packers, and consumers. The individual incentives are clear in that alternative

arrangements reduce costs, but market implications are less well known.

- Individual marketing arrangement choices seem to be interdependent with production decisions in the sense that different marketing methods allow specific changes in production systems.
- Marketing agreements exhibit considerable variation in details but appear to have consistent structures. The most common agreements use formula prices based on a reported liveweight price, a reported boxed beef price, or internal boxed beef prices and also include adjustments for premiums and discounts for meat quality and consistency.
- Alternative arrangements also appear to encompass various elements of price risk management.

The characteristics listed above may need to be accounted for in the analyses conducted in later parts of the study. In addition to the type of marketing arrangements and the characteristics of the marketing arrangement, the characteristics of the product traded will need to be accounted for in the analyses. Table 4-13 outlines these other characteristics of transactions for procuring fed cattle by packers and sales of beef products. In later parts of the study, we will collect data on these fields as part of the transactions data collection. These fields will allow us to address quality differences and price differences associated with alternative marketing arrangements. Also, analyses of these data will provide more objective evidence regarding the use, terms, and reasons for the use of alternative marketing arrangements in the beef industry.

Table 4-13. Characteristics of Beef Cattle and Beef Identified in Procurement and Sales Transactions

A procurement transaction is defined as the purchase of a pen or lot of fed cattle, and a sales transaction is defined as the sale of a specific type of raw or processed beef product.

Characteristic	Description
<i>Beef Packer Procurement Transactions</i>	
Quantity, Condition, and Cattle Type	
Number of head	Number of live cattle delivered in the lot
Liveweight	Net live or actual purchase weight for the lot (equal to gross liveweight minus shrink)
Hot weight	Total hot weight of the lot (carcass weight or dressed weight)
Condemned	Number of condemned and dead cattle in the lot
Cattle type	Primarily beef cattle, dairy cattle, or mixed beef and dairy cattle
Steers	Number of steers in the lot
Heifers	Number of heifers in the lot
Bulls	Number of bulls, stags, or bullocks in the lot
Cows	Number of cows or heiferettes in the lot
Quality and Uniformity Measures	
Quality grade	Number of head in the lot that were carcass grade Prime, Choice (Upper 2/3, Lower 1/3), Select, Standard, or Other (not graded)
Dark cutter	Number of head in the lot that were classified as dark cutters
Yield grade	Number of head in the lot that were carcass yield grade 1, 2, 3, 4, 5, or other
Heavy weight	Number of head in the lot that were classified heavy weight
Light weight	Number of head in the lot that were classified light weight
Other Measures	
Age 30+	Number of head in the lot that were 30 months of age and older
Branded/certification	Number of head in the lot that were eligible for branded or certification program (including Kosher and Halal)
<i>Beef Packer Sales Transactions</i>	
Quantity and Meat Type	
Total weight	Total weight of beef product in pounds for the transaction
Product code	Product code as defined by seller (if defined differently than IMPS code)
Product name	Beef product name
Quality Measures	
Quality grade	Beef product quality grade was Prime, Choice (Upper 2/3, Lower 1/3), Select, Standard, or Other (not graded)
Yield grade	Beef product yield grade was 1, 2, 3, 4, 5, or other

(continued)

Table 4-13. Characteristics of Beef Cattle and Beef Identified in Procurement and Sales Transactions (continued)

Characteristic	Description
Level of Fabrication/Processing	
Product classification	Beef product was classified as a carcass or quarter, primal cut, subprimal cut, ground (including trimmings), portion cut, case ready, fresh processed, ready to eat, or other product
Trim level	Beef product fat was trimmed to 3/4 inch (19 mm), 1/4 inch (6 mm), 1/8 inch (3 mm), practically free, peeled/denuded, or peeled/denuded (surface membrane removed)
Fat content	Percentage of fat content for ground beef and trimmings
Tenderization	Beef product was tenderized or marinated
Added ingredients	Beef product had added ingredients
Refrigeration	Beef product was chilled/fresh, frozen, or other
Packaging	Beef product was packaged in vacuum packaging, gas packaging, paper, combo bin, or other
Other Measures	
Branded	Beef product was produced and marketed under a corporate trademark or one of USDA's certified programs
Other certification	Beef product had another type of certification (including Kosher and Halal)

Note: IMPS = Institutional Meat Purchase Specifications.

4.3 PORK PRODUCERS AND PACKERS

In some parts of the United States, nearly all live pig and hog transactions occur under some type of contractual arrangement.

As discussed in Section 2, the pork industry slaughters the largest number of livestock of the three meat species. In some parts of the United States, nearly all live pig and hog transactions occur under some type of contractual arrangement. However, cash or spot markets still exist in many parts of the country. Some unique characteristics of the pork industry are the following:

- Production of pigs and hogs can be segregated into as many as three stages—farrow-to-wean, wean-to-feeder, and feeder-to-finish.
- Formal production contracts are used in which pork producers and feeders are compensated for their production services and do not take ownership of pigs and hogs on their farms.
- Formal marketing or procurement contracts are used to formalize a marketing relationship that is similar to marketing agreements in the beef and lamb industries (although marketing agreements are also used in the pork industry).

- A significant number of weaner and feeder pigs are produced in Canada and shipped to the United States for feeding and finishing.
- Contract production of hogs originated in geographical areas with limited or no tradition in hog farming and with a grain deficiency (Southeast) and spread into the traditional hog farming areas (Midwest). One reason for this is because poultry integrators that developed core competencies in livestock contract production successfully transplanted this expertise from broilers and turkeys into hogs.
- Contract production has likely contributed to substantial productivity gains in the hog industry. For example, the national average number of pigs per sow increased from approximately 13 to 16 from 1990 to 2000 (USDA-NASS, 2002b), and the average feed conversion ratio also increased dramatically.
- Contract production does not appear to be driving the increase in size of production of hog farms *per se*. It is the production and waste management technologies that exhibit increasing returns to scale regardless of the ownership structure that cause the increase in size of both independent and contract operations.
- Increasing returns to scale in swine production and waste management create more specialized animal production operations, thereby breaking the tradition of joint production of crops and livestock that characterizes traditional family farms. This specialization, together with a high concentration of livestock production in a few geographic areas, has caused substantial environmental problems in some cases and caused some individuals and interest groups to believe the industry is not particularly friendly to the environment.

In the sections below, we present the descriptive findings on type and classification of alternative marketing arrangements; terms used in alternative marketing arrangements; availability of alternative marketing arrangements; reasons for use of alternative marketing arrangements; and, finally, other information needed to understand marketing arrangements in the pig, hog, and pork markets.

4.3.1 Types and Classification of Spot and Alternative Marketing Arrangements Used in the Hog and Pork Industries

Table 4-14 outlines the types of pigs and hogs and pork products sold and the types of buyers for each. Weaner pigs are

Table 4-14. Animals and Products Traded in the Pork Industry

Three ages of pigs and hogs and various pork products are traded in the industry.

Animal or Product	Buyer(s)
Weaner pigs (8 to 12 pounds)	Wean-to-feeder operation Wean-to-finish operation Packer for contract production
Feeder pigs (40 to 55 pounds)	Feeder-to-finish operation Packer for contract production
Finished hogs (250 to 290 pounds)	Packer
Pork carcasses and quarters Pork primal cuts Pork subprimal cuts	Processor/Grinder Exporter
Ground pork	Processor Wholesaler Exporter Food service operator Grocery retailer
Pork portion cuts Fresh processed pork Ready-to-eat (RTE) pork products	Wholesaler Exporter Food service operator Grocery retailer
Case-ready pork	Wholesaler Exporter Grocery retailer

sold or transferred from a sow operation to a wean-to-feeder or wean-to-finish operation. After the feeder pig stage, feeder pigs are sold or transferred to a feeder-to-finish operation. Finished hogs are then sold or transferred to a packing plant.³ The majority of pork processing occurs within packing plants, but some pork carcasses, quarters, primal cuts, subprimal cuts, and ground pork products are also shipped to a separate location for fabrication or further processing. Once pork products are produced, the general categories of pork buyers are similar to other meats.

For pork producers, feeders, and finishers, the types of sales (or transfer) transactions are as follows:

- weaner pigs to wean-to-feeder or wean-to-finish operations,
- feeder pigs to feeder-to-finish operations, and
- finished hogs to packers for slaughter.

³Some small hogs are also sold directly for slaughter as roaster hogs in the 40- to 150-pound range.

All three of these stages might occur under the ownership of a single producer, or pigs might be bought and sold between each stage.

Figure 4-3 illustrates the types of marketing arrangements used for sales of live pigs and hogs. The key dimensions of marketing arrangements at each stage include the **ownership method** for the animal or product while it is at an establishment (e.g., hogs owned by the producer or owner of the farm, hogs not owned by the producer, and packer-owned farms) and the **pricing method** used. If formula pricing is used, a **formula base price** must be specified. The **valuation method** for carcasses might be on a per-head basis, liveweight basis, carcass weight basis, or primal cuts basis. Carcass weight valuation might be based on a grid that offers premiums or discounts based on weight and carcass quality grade. If animals or products are shipped from one establishment to another owned by the same company, an **internal transfer pricing method** must be specified.

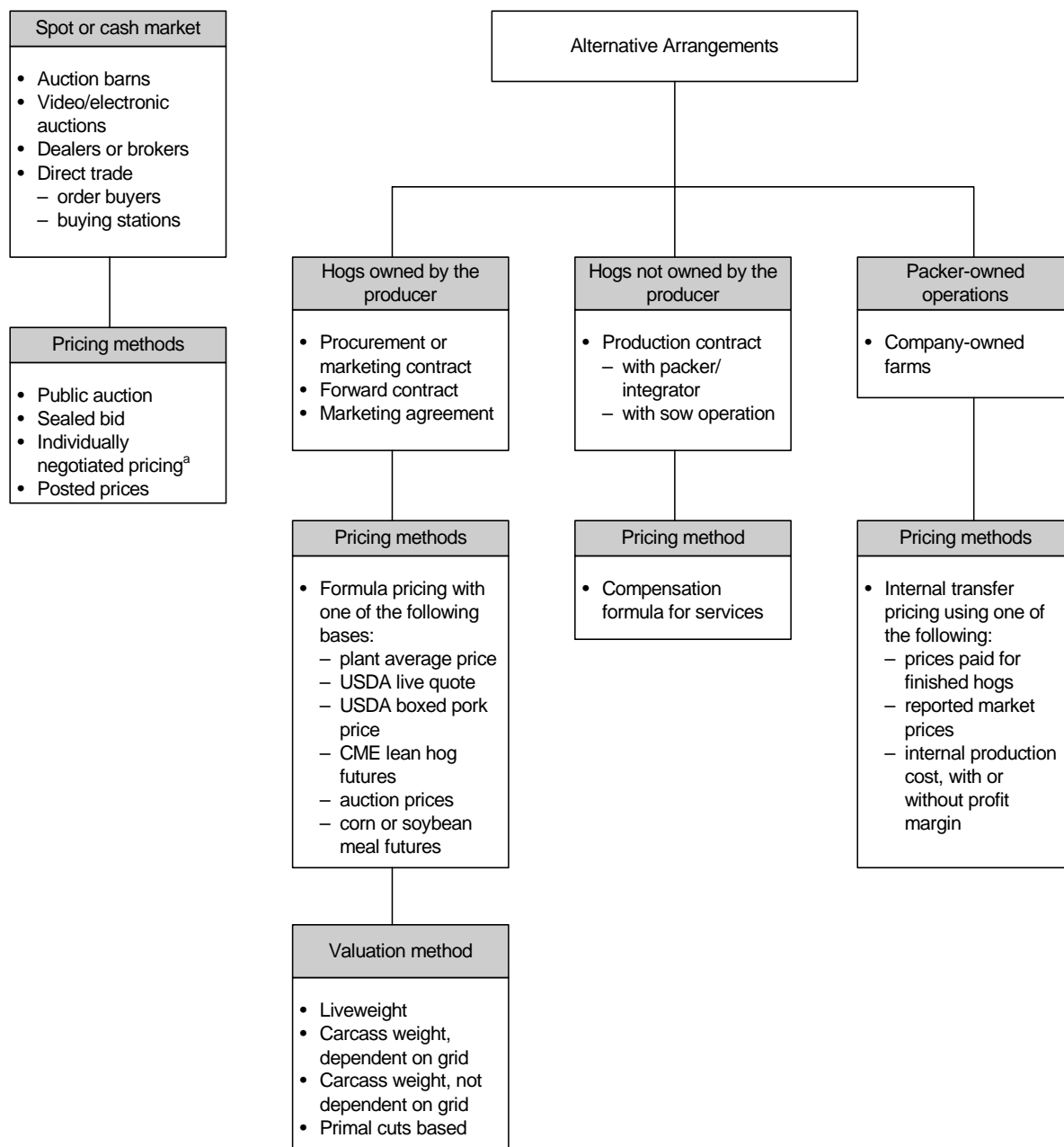
When procuring or purchasing weaner or feeder pigs, producers and growers appear to commonly use direct trade methods, receive their pigs under a production contract with an integrator or packer, or produce their own weaner pigs. Direct trade refers to direct negotiation between buyers and sellers. Other methods of procuring weaner or feeder pigs appear to be much less common, particularly in the eastern part of the United States where most transactions occur under some type of contract. Most producers and growers we spoke with produce their own weaner pigs from sows they own or receive weaner pigs under a production contract with an integrator.⁴ Some growers purchase weaner pigs for feeding and finishing on the open market through direct trade. Growers that produce a portion of their weaner pigs also may have marketing agreements to procure additional weaner pigs.

Pork packers procure finished hogs at auction barns, through direct trade or under forward contracts with hog finishers, or through internal transfer of finished hogs produced under production contracts or on company-owned farms. Integrators that do not slaughter hogs but contract with producers for feeding and finishing of hogs also sell finished hogs to packers.

⁴An integrator is a business entity that contracts with hog producers or growers to produce, grow, or finish hogs.

Figure 4-3. Marketing Arrangements for Sale or Transfer of Weaner, Feeder, and Finished Hogs by Pork Producers

Different types of pricing methods are associated with each type of marketing arrangement used in the industry.



^aIndividually negotiated pricing is often benchmarked against reported prices.

Based on our discussions with pork packers, they typically use a combination of marketing arrangements to ensure that packing plants operate close to full capacity.

These types of integrators typically own sow farms and use production contracts to feed and finish hogs for sale to packers. When selling to packers, nonpacking integrators typically use marketing agreements or more formal marketing contracts. When purchasing finished hogs on cash or spot markets, pork packers might use auction barns or buying stations (operated by the packer) in the Midwest. However, both of these methods are more typically used only for purchases of culled hogs in the eastern region of the United States. Based on our discussions with pork packers, they typically use a combination of marketing arrangements to ensure that packing plants operate close to full capacity. The range of marketing arrangements used by pork packers is so diverse that it is not possible, based on a limited number of discussions, to characterize typical usage. Even within a particular size category of packers, each packer uses a unique combination of marketing arrangements.

As mentioned previously, production contracts and marketing contracts as used in the pork industry are unique types of marketing arrangements and warrant further description.

Production contracts specify the division of production inputs supplied by the two parties, the quality and quantity of a particular output, and the type of the remuneration mechanism for the grower. The hogs are owned by the contractor (packer or integrator) who also assumes most of the price risk and some of the production risk. Because contractors control the volume of production and production practices, they tend to dictate the terms of contracts.

Marketing contracts refer to an agreement that establishes a price or pricing mechanism and an outlet for the product prior to harvest. Most management decisions remain with the growers because ownership is retained until harvest. Producers also assume all production risk but share price risk with a contractor. Forward contracting and price setting after delivery based on a predetermined formula that reflects quality grades and yields are examples of marketing contracts.

For pork packers, the types of sales (or transfer) transactions are as follows:

- carcasses from small pigs to specific buyers for roasting as whole pigs,

- carcasses and cuts from standard-weight hogs to processors or other downstream market participants, and
- boxed pork and processed pork products (primal cuts, tray-ready, case-ready, and other products) to downstream market participants.

Figure 4-2 presented in Section 4.3.1 outlines the types of arrangements used for sales of carcasses and meat products by all species of meat packers including pork. In addition to ownership method, pricing method, formula base, valuation method, and internal transfer pricing methods, **other pricing practices** might also be a key dimension of marketing arrangements used by packers.

Pork packers sell carcasses, cuts, or processed products to pork processors, wholesalers or distributors, exporters, food service operators, and grocery retailers through a variety of spot or cash market methods or under forward contracts or marketing agreements. Many packers also internally transfer products to other plants within a company for further processing. The types of spot or cash market transactions used include direct trade through individual negotiations with buyers, dealers or brokers, and electronic auctions. Electronic auctions refer to Internet-based sales in which buyers post their meat purchase specifications, and suppliers provide bids for supplying products that meet the specifications. Marketing agreements are fairly informal arrangements under which packers or processors agree to supply certain types and quantities of pork products to buyers on a regular basis. More formal agreements are required in cases where pork products are labeled with a specific brand name or products must meet specific customer specifications.

4.3.2 Terms Used in Spot and Alternative Marketing Arrangements in the Hog and Pork Industries

As listed in Section 4.1, several types of key terms define marketing arrangements in the livestock and meat industries. The key terms for production contracts and marketing or procurement contracts as they are used in the hog industry differ from the typical key terms used for other types of livestock sales. Thus, after describing the key terms for traditional types of marketing arrangements for sales of weaner pigs, feeder pigs, and finished hogs and for sales of pork carcasses and cuts, we describe the terms of these unique types of hog industry contracts in detail.

Key Terms in Sales of Weaner Pigs, Feeder Pigs, and Finished Hogs

Many arrangements specify that the producer must use a specific type of genetics, but others specify quality in terms of specific quality measures.

Based on discussions with pork producers, growers, and finishers and with pork packers, marketing arrangements for sales of pigs and hogs (other than under production contracts, marketing/procurement contracts, and transfers from company-owned farms) may be oral or written. Marketing agreements and forward contracts are generally written contracts, but some marketing agreements are oral. Most arrangements specify a specific quantity or a range of quantities to be delivered on a monthly, quarterly, or annual basis, but the buyer might purchase more at times. Penalties might or might not be applied if a producer does not meet the quantity requirements. Many arrangements specify that the producer must use a specific type of genetics, but others specify quality in terms of specific quality measures. In addition, pork packers might require that producers follow Pork Quality Assurance (PQA) Level III practices, humane handling practices, nutritional standards, antibiotic withdrawal requirements, and other specific practices. For finished hog sales, target weights for live hogs are generally specified (e.g., 245 to 265 pounds) in addition to percentage lean targets (e.g., 52 to 58 percent) and percentage yield targets (e.g., greater than 74 percent).

For sales of weaner pigs, per-head fixed pricing or formula pricing based on a percentage of the lean hog futures price might be used. For sales of feeder pigs, pigs might be priced based on a base price with slides that discount pigs that are above or below target weights (e.g., 50 pounds) because consistent-sized pigs are needed for the finishing stage. For sales of finished hogs, formula pricing based on a grid (or grade and yield) premium and discount system is typically used. The base prices for formulas include a wide variety of options, including hog production input prices, such as corn or soybean meal prices; hog prices, such as the Iowa-Southern Minnesota price; and pork output prices, such as the averages of USDA-reported primal cut prices. Futures prices are also used for base prices. Finished hogs might be discounted for sort loss (hogs that are too small or too big) or receive premiums for large lots, lean percentage, loin eye depth, and back fat depth. Back fat depth is measured using a Fat-O-Meat'er or similar technology.

Delivery of pigs and hogs is usually scheduled 3 days to a week in advance of delivery. However, buyers and sellers are generally in communication with one another weeks or months in advance. In some cases, the arrangements specify a number of loads per week; thus, buyers and sellers do not individually schedule each delivery. In sales of weaner or feeder pigs, arrangements and payment for transportation vary widely. However, in sales to packers, the hog finisher typically transports hogs to a buying station or directly to the packing plant. Termination options for arrangements range from 6-month to 5-year termination notices. "Evergreen" contracts that automatically renew each term appear to have the longest notice requirements. Some arrangements do not specify requirements for termination of the arrangement. Furthermore, most arrangements do not specify methods for resolving disputes. In cases where a contract specifies a dispute resolution mechanism, the contract typically specifies arbitration as the method.

Key Sales Terms of Sales of Pork Carcasses and Cuts by Packers and Processors

As with other types of meat sales, sales of pork carcasses, cuts, or processed products by pork packers are generally conducted under oral arrangements. In some cases, pork packers have informal agreements to supply purchases with a specific number of loads per week. Pork buyers might specify the weight range for carcasses, cuts, and other pork products; age of the hog from which the meat was cut; temperature of the meat; color of the meat; hardness of the fat; bacterial plate count for food safety assurances; and package integrity. Each product sold has a specification sheet that indicates weight of the product or individual cuts, fat trim level, and packaging. For pork trimmings used for grinding operations, the product is delineated by its percentage chemical lean.

Pricing is generally based on a formula in which the base is either a USDA-quoted price or based on prices that the packer is paying for hogs. Premiums might be offered for special product requirements specified by the buyer, level of trim, and whether the product is certified under process-verified certification. Discounts might be offered for large-volume purchases. Sales might be negotiated as little as a day to as much as a month in advance of delivery, but a week in advance appears to be the most typical. Arrangements and payment for

delivery are highly variable—packers might ship to the buyer without applying a separate delivery charge or ship to the buyer and charge for delivery or the buyer might pick up product directly from the packer. Because of the informal nature of sales arrangements for pork, termination options and dispute resolution are unspecified in nearly all cases.

Key Terms of Hog Production Contracts

A production contract is an agreement between an integrator or a packer (principal) and a grower (agent) that binds the grower to specific production practices.

A production contract is an agreement between an integrator or a packer (principal) and a grower (agent) that binds the grower to specific production practices. Different stages of production of hogs are typically covered by different contracts, and growers generally specialize in the production of hogs under one type of contract. The most frequently observed contracts in the pork industry are single production-stage contracts, such as farrowing contracts, nursery contracts, and finishing contracts. Some integrators and packers offer contracts that combine several production stages under one contract. These are known as farrow-to-finish contracts or wean-to-finish contracts.

All production contracts have two main components: one is the division of responsibility for providing inputs, and the other is the method used to determine grower compensation. Growers provide land, housing facilities, utilities (electricity and water), and labor and are also responsible for manure management and disposal of dead animals. Growers typically have full responsibility for compliance with federal, state, and local environmental laws regarding disposal of manure and dead animals. The principal provides animals, feed, medication, and services of field personnel. Expenses for smaller items might be shared. In some contracts, the principal reimburses the agent for a percentage of rendering plant costs but not for any costs associated with manure management (NPPC, 2000a). The principal also decides on the volume of production both in terms of the timing of rotations of batches on a given farm and the density of animals inside each production house.

Virtually all swine production contracts are settled based on one of three compensation methods for growers (NPPC, 2000a):

- base plus bonus payment per pound of gain (liveweight) transferred, where the bonus payment reflects some efficiency measure such as feed conversion;

- base payment per live animal transferred with bonuses for efficiency (also commonly including bonuses for reduced death loss and uniformity); and
- payments to the grower on a per-pig space, per-year basis (common in the Midwest for hog finishing contracts and wean-to-finish contracts).

In a fixed performance-standard setting, growers are competing against a predetermined constant technological standard such as the feed conversion ratio, whereas, in a tournament setting, the payment is determined by comparing the individual grower's performance with the group average.

Most of the production contracts also have a minimum guaranteed payment clause and a disaster payment clause, neither one of which would apply if the grower were grossly negligent of his production responsibilities.

The most widely used compensation schemes for finishing contracts are from the first two groups. The majority of finishing contracts are settled by some form of a fixed performance standard. Tournament schemes prevalent in broiler production contracts are very rare in the swine industry. In a fixed performance-standard setting, growers are competing against a predetermined constant technological standard such as the feed conversion ratio, whereas, in a tournament setting, the payment is determined by comparing the individual grower's performance with the group average. In both cases, the payment takes the form of a variable piece rate where the variation in individual piece rates depends on how efficiently the grower used the principal-supplied inputs.

A typical finishing contract requires that growers furnish fully equipped housing facilities and that they follow the management and husbandry practices specified by the principal. The principal provides the grower with feeder pigs, feed, medication, veterinary services, and services of the field personnel. The quality of all inputs and the time of placement of feeder pigs and shipment of grown animals are exclusively under control of the principal. Grower i 's compensation for husbandry and housing facilities rental is paid on a per pound-of-gain basis with bonuses earned on a per-head basis. In a simple contract, the bonus is based on the difference between the individual grower's feed conversion, expressed as pounds of feed divided by pounds of gain F_i/q_i , and a standard feed conversion ratio (e.g., $\phi = 3.35$). If the grower's ratio is above the standard, the grower receives no bonus and simply earns the base piece rate (e.g., $\alpha = 0.0325$) multiplied by the total pounds gained q_i . If the grower's ratio is below the standard ratio, the difference is multiplied by a constant (e.g., $\beta = 6.5$) to determine the per-head bonus rate. The total bonus payment

is then determined by multiplying the bonus rate by the number of pigs marketed (i.e., feeder pigs that survived the fattening process). Algebraically, the exact formula for total compensation is

$$R_i = \alpha q_i + \max\left[0, \beta\left(\phi - \frac{F_i}{q_i}\right)(1 - m_i)H_i\right],$$

where m_i measures the grower-specific mortality rate and H_i measures the number of feeder pigs placed on the grower's farm.

Occasionally, the bonus schemes are even more elaborate to try to elicit greater grower effort.

Occasionally, the bonus schemes are even more elaborate to try to elicit greater grower effort. One such example is a contract with the same basic payment structure as the one above but with an added weight category bonus. The new weight category results in an additional bonus amount paid to growers who are able to produce specific weight categories of animals. For example, if the batch average weight per delivered animal q_i^* happens to be in the range between 230 and 239 pounds, the grower will get $\alpha' = 0.035$ per pound for each pound in that range, all multiplied by the number of delivered animals. If the average weight falls in the range between 240 and 259 pounds, the grower will get $\alpha'' = 0.045$ per pound for each pound in that range, plus 10 pounds from the first bracket valued at α' each, all multiplied by the number of delivered animals. Finally, in the 260 or higher range, the grower will get α' per pound, plus 20 pounds from the second bracket valued at α'' each, plus 10 pounds from the first bracket valued at α' each, all multiplied by the number of delivered animals. Algebraically, the modified contract has the following form:

$$R_i = \alpha' q_i + \max\left[0, \beta\left(\phi - \frac{F_i}{q_i}\right)(1 - m_i)H_i\right] + b_i$$

where the weight category bonus is given by

$$b_i = \begin{cases} 0 & \text{if } q_i^* < 230 \\ \alpha'(1 - m_i)H_i(q_i^* - 229) & \text{if } 230 \leq q_i^* \leq 239 \\ 10 \times \alpha'(1 - m_i)H_i + \alpha''(1 - m_i)H_i(q_i^* - 239) & \text{if } 240 \leq q_i^* \leq 259 \\ 10 \times \alpha'(1 - m_i)H_i + 20 \times \alpha''(1 - m_i)H_i + \alpha'(1 - m_i)H_i(q_i^* - 259) & \text{if } 260 \leq q_i^* \end{cases}$$

A well-designed (optimal) contract needs to strike a balance between providing incentives for the agent to exert effort and alleviating his exposure to risk.

The reasons for such elaborate payment schemes are because the interests of growers and integrators or packers are not in unison. The principal offering a contract needs to align the incentives to induce growers to act in his interest. The problem is magnified by the fact that the principal cannot directly observe the grower's actions (effort), and the outcome (output) is influenced by immeasurable effects of random factors (such as weather). The conflict of interest between the contracting parties arises because the agent's effort contributes to the increase in output, which is the same output that affects the principal's income. Therefore, the principal wants the agent to work hard, but since effort is costly, there is a tendency for the agent to shirk. Because of imperfect information on the agent's effort, the principal cannot specify and enforce the desired level of effort (referred to as the moral hazard problem). In addition, because of the stochastic nature of the production process, the principal cannot verify whether a bad outcome is caused by the agent's shirking or by the unfavorable state of nature. Making the agent's income dependent on the consequences of his effort mitigates the nonalignment of work incentives. However, the problem with this design is the fact that it makes the agent's income variable a consequence of the presence of random shocks that influence the outcome. Hence, the result of the agent's effort would depend not only on his own actions but also on uncertain factors beyond his control. Being risk averse, the agent prefers a certain income to an uncertain income. A well-designed (optimal) contract needs to strike a balance between providing incentives for the agent to exert effort and alleviating his exposure to risk (Vukina, 2003).

Instead, the payment mechanism that emerged in most livestock production contracts (in combination with the division of production responsibilities discussed before) is a uniform contract almost invariably based on a piece rate combined with some type of performance bonus.

With heterogeneous producers or growers whose types can be observed by the principal (in the sequence of contract renewals) and because of the moral hazard problem, it has been shown that the optimal contract is a menu of individualized contracts (Levy and Vukina, 2002). The fact that individualized contracts are hardly ever observed is most likely the consequence of sizeable screening, administrative, and other transactions costs. Instead, the payment mechanism that emerged in most livestock production contracts (in combination with the division of production responsibilities discussed before) is a uniform contract almost invariably based on a piece rate combined with some type of performance bonus.

However, it is interesting to note that some of the production contracts observed in the Midwest for hog finishing and wean-to-finish involve grower compensation based on the fixed payment per pig space, per year. For example, one of those contracts might pay a contract grower \$40 per square foot of the housing facility per year, regardless of whether the facility was full or empty. The only supposed remedy for moral hazard is a threat that the principal would take over the management of the agent's production facility in case of nonperformance. The reason for the existence of such an extremely simple scheme can be best understood by observing that the potential incidence of moral hazard in this particular type of environment is rather low. Based on the industry discussions, contract producers that grow hogs under this type of contract have operations with new and identical buildings. The input from the principal's field personnel is substantial (daily visits), the company owns and controls the source of pigs, and the contract requires that contract growers be PQA Level III certified. In this highly controlled environment, with substantial upfront screening of agents' types, the imperfect observability of grower effort does not present a large problem. The savings resulting from extremely simple record keeping and payments surely offset the potential benefits that may have been generated with implementing a complex incentive scheme.

Production contracts for other stages of swine production, such as farrowing and nursery contracts, have very similar structures, although they tend to be less standardized than finishing contracts.

Production contracts for other stages of swine production, such as farrowing and nursery contracts, have very similar structures, although they tend to be less standardized than finishing contracts. The division of responsibilities for essential inputs is the same as in finishing contracts. The principal owns animals and supplies feed, and the agent owns the housing facilities, supplies utilities and labor, and is responsible for waste management. The division of smaller expenses, such as veterinary services, animal care products, insecticides, and supplies, may vary from contract to contract, even within the same contracting firm. Performance standards (e.g., pig survivability, sow productivity, feed conversion) vary considerably from contract to contract as well. Both farrowing and nursery contracts are usually settled on a per-animal transferred basis because the principal has little or no flexibility in delaying the removal of animals. Bonuses for achieving excellent production results and low death losses are typically generous. Attractive bonus structures and the fact that these

operations produce less manure are the key reasons why a disproportionate number of growers choose these contracts over finishing contracts (NPPC, 2000a).

As an alternative to or in combination with per-pig payments, farrowing contracts sometimes include a fee per sow and mated gilt in the breeding herd, a specified amount for each crate and/or square foot of pen space, or a portion of gross proceeds from the sale of pigs. Some farrowing contracts provide an efficiency bonus in addition to the base payment for each pig produced. The bonuses are usually based on the number of pigs produced per sow per year. For example, the grower might receive the following increases relative to the base payment for the following numbers of pigs per sow per year:

- 17.5 pigs per sow per year—base payment only;
- 18 pigs per sow per year—additional \$0.48 per pig;
- 18.5 pigs per sow per year—additional \$0.95 per pig;
- 19 pigs per sow per year—additional \$1.42 per pig;
- 19.5 pigs per sow per year—additional \$1.89 per pig;
- 20 pigs per sow per year—additional \$2.37 per pig;
- 20.5 pigs per sow per year—additional \$2.84 per pig;
- 21 pigs per sow per year—additional \$3.31 per pig;
- 21.5 pigs per sow per year—additional \$3.78 per pig; and
- 22 pigs per sow per year and above—additional \$4.25 per pig (NPPC, 2000a).

Survivability and/or feed efficiency bonuses are quite common.

Payments in nursery contracts are based on a pig fee, pen space fee, or a portion of the gross proceeds. Survivability and/or feed efficiency bonuses are quite common. A survivability bonus is normally paid ranging from \$0.25 to \$0.30 per head for a 1 percent mortality rate down to no bonus for a 2.5 percent or higher mortality. An example of a feed efficiency scheme that relates ranges of feed conversion ratios and premiums paid per feeder pig is as follows:

- 1.50 to 1.59—\$0.08 per feeder pig;
- 1.60 to 1.64—\$0.05 per feeder pig;
- 1.65 to 1.69—\$0.04 per feeder pig;

In addition to the division of responsibilities for providing inputs and payment mechanisms, other critical elements of production contracts are contract length, contract termination, and provisions for dispute resolution.

- 1.70 to 1.74—\$0.03 per feeder pig;
- 1.75 to 1.79—\$0.02 per feeder pig;
- 1.80 to 1.84—\$0.01 per feeder pig; and
- 1.85 and above—no bonus (NPPC, 2000a).

In addition to the division of responsibilities for providing inputs and payment mechanisms, other critical elements of production contracts are contract length, contract termination, and provisions for dispute resolution. The length of contracts in the swine industry varies across contractors and production stages, but contracts are typically long term, such as 5 to 10 years, as distinguished from broiler contracts, which are typically short term (flock by flock). Most swine production contracts provide an avenue for either party to terminate the relationship. This usually requires notice some number of weeks or months prior to termination. The grower may terminate the contract if the contractor fails to deliver animals or feed or fails to make payments to the grower. The principal can terminate the grower for not following the prescribed husbandry practices, failure to report death or disease outbreaks, theft of animals or feed, housing of any swine other than the contract swine in the contract facilities, failure to forward production records, failure to follow instructions given by the principal's field personnel, and continued poor performance. In addition to litigation, the most common method for resolving legal disputes, alternative dispute resolution methods such as mediation and arbitration are becoming more important because many contractors include such provisions in production contracts and some state laws encourage their use.

Marketing and procurement contracts are verbal or written agreements between a contractor and a grower to transfer the ownership of pigs at some time in the future.

Key Terms of Hog Marketing and Procurement Contracts

Marketing and procurement contracts are verbal or written agreements between a contractor and a grower to transfer the ownership of pigs at some time in the future.⁵ A marketing contract sets a price (or a pricing mechanism) and an outlet for pigs before they are ready to be transferred. Contracts often specify product quantities, the range of acceptable quality measures, and delivery schedules. Most management decisions are made by the growers because they retain ownership of the animals during the growing stage. Growers typically assume all

⁵The terms "marketing" and "procurement contracts" are used interchangeably; thus, we use the term "marketing contract" in this discussion.

production risk, whereas the pricing mechanism limits their exposure to price risk. The fundamental difference between marketing contracts and production contracts is that marketing contracts involve the transfer of ownership (buying and selling) between the two parties, whereas production contracts involve the payment for production services and the ownership of pigs never changes. With respect to both ownership and control, in a continuum of various marketing arrangements, marketing contracts can be visualized as spanning the interval between spot/cash markets and production contracts.⁶

Most marketing contracts are written in a take-it-or-leave-it form and are rarely individually tailored to satisfy the specific needs of both sides.

It appears that the motivations for using marketing contracts might be greater on the buying side than the selling side. This claim is mainly supported by the evidence that most marketing contracts are usually initiated by buyers and seldom by sellers. This means that most marketing contracts are in fact procurement contracts where the contractor (the person writing the contract terms) is a buyer. Another valid explanation, especially for marketing contracts offered by packers, has to do with asymmetric market power. The reason most marketing contracts are written by buyers is because this industry segment (packers) is more concentrated than the selling side (producers). Most marketing contracts are written in a take-it-or-leave-it form and are rarely individually tailored to satisfy the specific needs of both sides. The latter possibility is typically reserved for very large suppliers. However, marketing contracts are sometimes written by industry participants other than packers. For example, producers with nursery and or finishing buildings occasionally use marketing contracts to secure a steady influx and desired quality of weaned or feeder pigs. In this case, the fact that producers initiate marketing (procurement) contracts cannot be explained by the market power asymmetry but rather by cost/technology and consumer demand considerations discussed below.

⁶The sample of marketing contracts listed on the Iowa Attorney General's Web site shows that contracts range in duration from 34 months to 10 years, producers are typically required to deliver a specific number of hogs per period of time, compensation is typically based on the Iowa/Minnesota plant delivered live or carcass price or Western Corn Belt carcass price with premiums or discounts based on a carcass pricing grid, nearly all contracts contain standards for minimum live or carcass weight, many have minimum quality requirements, and most also have some element of price risk management (Martinez and Zering, 2004).

The primary motives for packers to offer marketing contracts include quantity and quality assurances.

The primary motives for packers to offer marketing contracts include quantity and quality assurances. Meatpacking exhibits substantial economies of scale in processing and waste management. Therefore, large packing plants face high fixed costs and strive to achieve high capacity utilization. In an attempt to reduce the risk of hog supply shortages, packers have strong incentives to attenuate supply variation by forward scheduling hogs for slaughter. A related factor is a desire to narrow quality standards for incoming hogs. This is dictated both by consumer demand and by a highly automated production process. As explained by Martinez and Zering (2004), quality concerns have been historically defined only in terms of the lean/fat characteristics of hogs, but they are now increasingly focusing on other meat quality attributes, such as pH, color, water-holding capacity, taste, tenderness, and food safety considerations.⁷ Particular quality requirements effectively narrow the available supply, so packers try to capture this specific type of supply through marketing contracts.

The difference between market prices and contract prices represents a premium for income insurance provided by the contractor.

A primary motive for producers to enter into these marketing contracts is related to price risk management. With multiperiod marketing contracts, time devoted to marketing of hogs is considerably less compared to other price risk management tools such as futures contracts, options on futures, or short-term forward contracts. The pricing mechanisms incorporated in many marketing contracts secure a certain level of price risk shifting from the producer to the contractor, making the producer's income less volatile over time. In return for this income stability, producers give up some market flexibility and upward income potential, as reflected in the lower average contract prices relative to the market. The difference between market prices and contract prices represents a premium for income insurance provided by the contractor. The size of the premium depends on a particular producer's risk aversion. This arrangement transfers risk from small producers, who are poorly equipped to handle it, to large, sometimes publicly traded companies whose ownership and portfolio diversification make them far more able to assume risk compared to small risk-averse farmers.

⁷Declining pork quality associated with breeding programs to reduce fat content was linked to "Porcine Stress Syndrome," a gene carried by some of the leaner genetic lines of hogs. "Pale, soft exudative" (PSE) pork has inferior characteristics.

A marketing contract eliminates market access risk and provides the producer with a secure outlet for hogs.

In addition to price risk, producers typically face the risk of inadequate market access that manifests itself in having difficulty finding buyers, or more likely in scheduling deliveries consistent with the timing of their production systems. A marketing contract eliminates market access risk and provides the producer with a secure outlet for hogs. This is arguably an even more important aspect of marketing contracts than the price risk reduction because producers could possibly smooth out the highs and lows of the hog prices themselves through other mechanisms such as the futures or options market. The fact that they predominantly choose marketing contracts proves they also value secure market access.

Broadly speaking, marketing contracts can be divided into two main groups:

- short-term forward price agreements (also known as CME agreements) and
- long-term marketing contracts.

CME agreements determine a fixed price for hogs that will be delivered in the future. These contracts are typically lot-by-lot contracts negotiated as little as 30 days prior to delivery, but most are negotiated 5 to 6 months prior to delivery. The fixed price offered in the contract is typically related to the futures price at the time of contract execution (delivery) because the buyer (either a packer or an integrator) will typically place a hedge in the CME lean hogs futures at the time the agreement is made. These contracts may benefit small to mid-size producers because they do not have to figure out how to hedge themselves, do not incur transactions costs associated with hiring a broker, and avoid the liquidity problems associated with margin calls. Large producers may also prefer this type of contract because it avoids liquidity problems while still being able to track the market. A variation to the fixed price CME contract is a **fixed basis contract**. In this case, the producer can fix the transaction price at the futures price plus or minus the basis (cash price minus futures price). The producer may be given the option of never establishing the price using the fixed basis if delivery at the going market price is advantageous. Fixed basis contracts may be offered as far into the future as futures contracts are traded, usually 12 or 14 months (NPPC, 2000b).

Depending on how the price or the pricing mechanism is determined, **long-term marketing contracts** come in four basic varieties:

- formula price,
- cost plus,
- price window, and
- price floor.

The GIPSA swine contracts library lists nearly 80 different base prices used, including a variety of cash hog market prices, such as various regional and national USDA-reported weighted-average prices, plant average prices, or terminal market prices.

Each of these is combined with price differentials or premiums based on factors such as length of commitment, location, or overall quality of hogs. **Formula prices** are used as mechanisms to establish prices over extended periods in which multiple lots of hogs are forward contracted. The formula price is determined in reference to some market price or “base price.” The GIPSA swine contracts library lists nearly 80 different base prices used, including a variety of cash hog market prices, such as various regional and national USDA-reported weighted-average prices, plant average prices, or terminal market prices (Schroeder, Mintert, and Berg, 2004).⁸ For example, the base price used in the formula pricing may be determined in reference to the Iowa-Southern Minnesota weighted average price of 49 to 51 percent lean hogs that are plant delivered. The formula price will move together with the market price and therefore will generally not provide price risk protection for producers. Another problem is that the characteristics of the market on which the formula price is based may change relative to the other markets such that for some periods one price (e.g., Western Corn Belt) may be predicting the other base price (e.g., Iowa-Southern Minnesota) fairly well, but in some other periods, one price may be systematically different and create a disadvantage to the producer. However, the main benefit of this arrangement to producers is that market (plant) access is guaranteed during the life of the contract.

A **cost-plus contract** has a base price based on feed costs. Feed costs typically include corn and soybean meal, and prices for these feeds are typically based on the near-term Chicago Board of Trade (CBOT) futures prices. Such agreements usually set a minimum (floor) price level, so they essentially guarantee

⁸As indicated in Section 1, the GIPSA swine contracts library is available at <http://scl.gipsa.gov/content.aspx?page227§ion=10>).

a margin above some standard cost of production. Other provisions may also include sharing the difference between the contracted base price and the observed market price. For example, if the average closing price of the nearby corn futures contract during June was \$3.615 per bushel and the average closing price of the nearby soybean meal futures contract was \$246.70 per ton, then, as of July 1, the cost index (which typically gets adjusted monthly) equals $C = 6,082$ and is obtained by $(\$361.50 + \$246.70) \times 10$. The contract floor price is determined by $\$40.00 + ((C - 5,000)/250) = \44.328 . This floor price is compared with the market price (e.g., plant-delivered bid price per live carcass weight at the mid-session of the market for the Iowa-Southern Minnesota #1-3 Barrow/Gilt for 220- to 260-pound butchered hogs, as reported by USDA Market News Service for the day of delivery); then if the market price is smaller or equal to the floor price, the contract price is equal to the floor price. If the market price is greater than the floor price, then the contract price is the floor price plus 80 percent of the difference between the market price and the floor price. Carcass quality premiums, if the contract specifies any, are calculated in addition to the cost-plus formula price. In addition to market access benefits, cost-plus contracts offer some level of price risk insurance. These contracts typically range from 4 to 7 years.

Ledger accounts are used to smooth cash flow for both producers and packers over the life of a contract.

Cost-plus contracts may have a balancing clause, sometimes called "cash flow assistance agreement," but also commonly known as a "ledger." In situations where the cost-plus contract price paid exceeds the market price, the difference may be accounted for by adding it to the producer's ledger account. In cases where the market price exceeds the cost-plus price, the difference is added to the packer's ledger. Ledger accounts may be interest free or interest bearing (on both sides). The rationale behind the ledger accounts is that they should work like self-liquidating loans; over the term of the contract and the hog cycle, the ledger account will be close to zero when the contract expires. Some contracts have specified credit limits, at which point the packer essentially begins paying the market price for hogs or the producer must begin to pay down the account (NPPC, 2000b).

Price window contracts are very similar to cost-plus contracts, except that both ceiling and floor prices are prespecified. When a market hog price in a predetermined

market falls within this window, the hogs are exchanged at the market price. When the market price falls outside this window, the packer and producer split the difference between the two prices according to a prespecified formula (usually 50:50). Some window contracts use moving averages of prices to further smooth the contract payoffs. Other terms are fairly similar to cost-plus contracts. These contracts do not offer as much income insurance as the cost-plus contracts, but they still mitigate some of the market price fluctuations.

Another variation on cost-plus and window contracts is **price floor contracts**. As implied by the name, this type of contract sets a minimum price that a grower receives for hogs regardless of the market price. However, the premium that the grower pays the contractor for this insurance is in the form of a payment above some predetermined ceiling price that will then be used to subsidize the floor price when the market prices are low. For example, for the grower to receive a guaranteed floor price of \$40 per cwt, he must put \$0.50 per cwt into an account with the packer when the market price reaches a level above \$45 per cwt, and he must put \$1 per cwt into the packer's account when the market price exceeds \$48 per cwt. The packer is essentially maintaining a savings account that the producer draws down when prices are low. The balance in the account can be positive, in which case the packer owes money to the producer or negative in which case the producer owes the packer. The contract length is usually 5 years and is renewable if a balance in the account remains (NPPC, 2000b).

In marketing contracts, hogs can be priced on a liveweight or carcass weight basis.⁹ Some contracts require that live prices be converted to carcass prices or vice versa. The key issue in such contracts is the conversion factor. Some contracts use a fixed standard yield (say a traditional 73 to 74 percent), and others use plant average carcass yield or the average yield of hogs purchased under the contract. The variation in yields affects the application of quality premium schedules and ultimately the final price received. These problems are avoided in contracts that use market prices on a carcass weight basis in all contract computations. A relatively new contract pricing system uses a formula based on prices of primal pork cuts

⁹Martinez and Zering (2004) report an increase in hogs purchased by packers based on carcass evaluation from 17 percent in 1992 to 72 percent in 2001.

(USDA's carlot pork price) instead of the live or carcass weight prices.

An example of a **primal cut-based pricing system** is provided in Table 4-15 (from NPPC [2000b], p. 38). This type of pricing scheme should better align the producer's and packer's incentives to produce high-quality pork that the market desires. However, as pointed out by Schroeder, Mintert, and Berg (2004), the problem with this pricing scheme is that, despite the fact that hog prices and pork prices follow a similar trend, their difference varies substantially over time. This suggests that a simple forecast of hog prices based on the carlot pork prices corrected for some constant amount (to account for the packer's gross margin) can substantially overpredict or underpredict hog prices. Thus, this can have negative effects on producers whose payments are based on such a formula. Another problem is that primal yields are likely to be defined as plant averages because it is very costly to track each animal's individual primal yields. It is very difficult for the producer to establish whether the primal yields from his animals are consistent with the plant averages. The same problem is encountered when using standard yields for conversion between liveweight and carcass weight, as discussed previously.

In most marketing contracts, the total price that the producer will receive for his hogs is the combination of the base price (formula, cost-plus, window, or floor price) and various quality premiums.

In most marketing contracts, the total price that the producer will receive for his hogs is the combination of the base price (formula, cost-plus, window, or floor price) and various quality premiums. Some contractors pay high base prices and low-quality premiums; others do the opposite. In some contracts, the premiums are paid in dollars per pound; in other contracts, they are paid as a percentage of the base price. Absolute dollar amounts are better for producers in low markets, and percentage premiums are better in high markets. Contracts are typically specified such that the total payment to the producer is determined by adding the packer's standard quality grid to the contracted base price. Carcass-pricing programs increase producers' costs associated with evaluating alternative packers' bids. Some packers prefer lighter carcasses, whereas others that specialize in boxed products may prefer heavier carcasses. Also, packers may revise carcass-merit matrices as preferred characteristics of market hogs change in response to changes in the distribution of carcass quality. In general, as carcass quality

Table 4-15. Example of a Hog Primal Cut-Based Pricing System^a

In this example, the estimated cutout value is \$96.18, and the estimated liveweight price is $\$96.18/2.5 = \38.47 per hundredweight.

Primals	Yield	Cutout Weight (lb.)	Cutout Price \$/cwt	Cutout Value
Pork loins	21.35%	32.03	\$107.92	\$34.56
Pork shoulder butt	11.00%	16.50	\$68.71	\$11.34
Pork spareribs	3.20%	4.80	\$110.50	\$5.30
Fresh hams	17.10%	25.65	\$65.57	\$16.82
Pork bellies	8.95%	13.43	\$50.08	\$6.73
Pork hocks	2.95%	4.43	\$25.00	\$1.11
Pork neck bones	2.69%	3.90	\$25.00	\$0.98
Lean boneless pork trim	5.80%	8.70	\$52.51	\$4.57
Fat boneless pork trim	10.00%	15.00	\$30.52	\$4.58
Fresh picnic	12.20%	18.30	\$55.70	\$10.19
Unaccounted for	4.85%	7.28	\$0.00	\$0.00

^aCalculations are based on 250-pound liveweight hog with 60 percent (150 pounds) yield to primals.

Source: National Pork Producers Council. 2000a. "Guide to Contracting: Marketing." Des Moines, IA: National Pork Producers Council.

has improved, leanness premiums have declined (NPPC, 2000b).

An example of a carcass merit matrix from the GIPSA swine contract library is reproduced in Table 4-16 for illustrative purposes. As the table indicates, for the leanest carcasses (between 60 and 60.9 percent lean) and for liveweight ranging between 232 and 263 pounds (which corresponds to 172 to 195 pounds of carcass weight), the producer receives a price premium of 5 percent over the base price (index 105). The same weight category carcasses that are only 42 to 42.9 percent lean will receive a penalty of 8 percent below the base price (index 92).

Carcass-pricing programs also increase packers' costs related to sorting, record keeping, and pricing hogs. Given the lack of uniformity of market hogs, the question is whether these costs can be reduced by using an alternative contract design. When purchasing hogs without measuring each one, the packer must be reasonably sure that the size and quality are not going to vary significantly from sample to sample. As documented by Martinez and Zering (2004), more recent developments in

Table 4-16. Example of a Hog Carcass Merit Adjustment Schedule

The highest premiums are associated with hogs in the 57 to 58.9 percent lean range.

Liveweight Range	180–196	197–216	217–231	232–263	264–292
Carcass Weight Range	133–145	146–160	161–171	172–195	196–216
Lean % Range	Percent				
60–60.9	88	93	101	105	105
59–59.9	88	93	101	105	105
58–58.9	88	94	101	106	106
57–57.9	88	94	101	106	106
56–56.9	88	93	101	105	105
55–55.9	88	93	101	105	105
54–54.9	88	92	101	103	103
53–53.9	88	92	101	103	103
52–52.9	88	91	101	102	102
51–51.9	88	91	100	102	102
50–50.9	88	90	99	100	100
49–49.9	88	90	99	100	100
48–48.9	88	90	98	98	98
47–47.9	88	90	97	97	97
46–46.9	88	90	96	96	96
45–45.9	88	90	95	95	95
44–44.9	88	90	94	94	94
43–43.9	88	90	93	93	93
42–42.9	88	90	92	92	92

Source: Martinez, S.W., and K. Zering. 2004. "Pork Quality and the Role of Market Organization." U.S. Department of Agriculture, Economic Research Service, Agricultural Economic Report Number 835. Washington, DC: USDA.

contract design seem to indicate a very gradual but consistent shift toward requirements for more uniform production practices with a declining emphasis on measurement of individual carcass quality.

The main reason for this shift is difficulties associated with measuring PSE indicators because PSE-related quality problems do not become apparent until 20 to 24 hours postmortem, by which time the identity of the producer may have been lost. Difficult-to-measure, but highly task-programmable, quality characteristics favor the use of behavior-oriented rather than outcome-oriented contract designs. Such contract provisions reduce packer costs associated with measuring the quality attributes but increase costs of monitoring producer actions. By analyzing 15 long-term marketing contracts from the Iowa

By analyzing 15 long-term marketing contracts from the Iowa Attorney General's Web site, Martinez and Zering (2004) found that all contracts contain some type of safety-related provisions, five contracts have specific clauses with minimum PSE standards, and nearly all contain terms related to inputs that affect the PSE condition.

Attorney General's Web site, Martinez and Zering (2004) found that all contracts contain some type of safety-related provisions, five contracts have specific clauses with minimum PSE standards, and nearly all contain terms related to inputs that affect the PSE condition. Ten contracts have clauses requiring the use of specific genetics or the source of feeder pigs, five contracts require producers to handle hogs in a humane manner or in a way that optimizes meat quality, nine contracts require the use of company-approved or company-specific feeding programs, and five contracts require company-approved housing facilities. Two thirds of the contracts give the packer the right to inspect the producer's hogs and facilities, six contracts have clauses that permit producers to visit the packing plant, and seven contracts allow the producer to review packer receipt and payment records.

Finally, the disincentives for lean hogs are documented in the carcass-merit matrix in Table 4-16, which indicates that the leanest carcasses (between 59 and 60.9 percent lean) with liveweight between 232 and 292 pounds receive a percentage premium of 105 percent compared with 106 percent for less lean carcasses (i.e., those between 57 and 58.9 percent lean). The table contains data for December 2003, indicating that deemphasizing leanness is a relatively recent phenomenon in long-term marketing contracts. If the tendencies recorded by Martinez and Zering (2004) are to continue, then one can reasonably anticipate a growing importance of production contracts relative to marketing contracts because the standard production contract design solves almost all of the above quality problems.

4.3.3 Availability of Alternative Marketing Arrangements to Pork Industry Participants

Specific alternative marketing arrangements might or might not be available to market participants based on a number of factors. Some of the general factors that might affect availability of particular types of arrangements include the relative sizes of the establishment if buyers need large product volumes and the distance required for transportation of livestock and products. Other specific factors affect availability for both buyers and sellers. However, if market participants are not interested in changing their existing marketing arrangements, then availability of alternatives is not a concern. In the discussions with pork feeders and finishers, none of them

In the discussions with pork feeders and finishers, none of them noted that they would like to be using any other types of marketing arrangements for procuring weaner pigs and feeder pigs other than their current arrangements.

noted that they would like to be using any other types of marketing arrangements for procuring weaner pigs and feeder pigs other than their current arrangements. In addition, they did not expect any changes in their methods of procurement in the next several years, although some are considering producing their own weaner pigs rather than purchasing weaner pigs or consolidating all weaner pig purchases to one supplier.

Although a few hog producers noted that there are not any sales methods they would like to be using that are unavailable to them, others noted types of arrangements that they would like to use in the future. In particular, some producers said they would like to be able to

- participate in a producer-owned cooperative that would allow ownership of product further down the supply chain,
- establish a buying group that would help consolidate hogs in sales to packers to capture volume premiums,
- sell weaner hogs on the cash market to benefit from the current high market prices rather than selling under current contract commitments,
- use more option contracts with an independent broker for risk management, and
- finish hogs and let contracts for feeding and finishing of weaner pigs expire.

However, most producers do not expect substantial changes in their sales methods.

In discussions with pork packers, availability of particular types of arrangements for purchasing finished hogs is limited based on producer interest in participating in particular types of arrangements. For example, some packers noted that they would like to offer future contracts or payment terms using a formula based on meat value, but producers have been reluctant to use these methods for their hog sales. Most packers, however, expect little or no change in their procurement methods in the future.

Similar to the procurement side, most pork packers did not note that they would like to use sales methods that were unavailable to them. However, some packers noted they would like to have "cost-plus" contracts (although this appears to be unlikely) or complete more sales under a marketing agreement

Although most pork packers expect no change in sales methods for pork, one notable exception was that some pork customers may drive packers toward using electronic auctions for pork sales transactions.

using a formula pricing method. Although most pork packers expect no change in sales methods for pork, one notable exception was that some pork customers may drive packers toward using electronic auctions for pork sales transactions. In these electronic auctions, meat buyers post their product specifications and then suppliers submit bids. Packers also noted that because customers are making demands for a certain level of quality in products supplied, contracts on the procurement side are essential for them to meet these requirements.

4.3.4 Specific Reasons Pork Industry Participants Enter into Marketing Arrangements

In Section 4.1, we introduced some general reasons why market participants might use only the cash or spot market or might use alternative marketing arrangements. In this section, we describe reasons given during discussions with pork industry participants. Some of the reasons mentioned by hog producers for using particular types of marketing arrangements for pig procurement were as follows:

- use the cash market for purchasing isowean pigs to avoid health problems associated with buying isowean pigs from other suppliers used in the past;
- operate under production contracts to avoid the need to own sows and therefore avoid PRRS problems, which cause sow mortality and low weaning weights; and
- receive weaner pigs under a marketing agreement using a partner arrangement to expand inventory with lower capital requirements.

Some of the reasons mentioned by hog producers for using particular types of marketing arrangements for pig and hog sales were because these methods allow producers to

- expand hog operations because long-term marketing agreements with packers ensure a market for finished hogs,
- sell hogs using direct trade with particular packers with which they have developed relationships and from which they receive premiums for high-quality hogs,
- use marketing agreements to avoid negotiating every load of hogs and ensure shackle space for pigs,

- use marketing contracts or marketing agreements with multiple packers to allow for additional risk management,
- sell directly to packers on the spot market but also use forward contracts for risk management (forward contracts ensure a base price and shackle space for hogs in the slaughter plants),
- sell in the cash market to have an understanding of the current market situation but also use contracts for risk management, and
- sell hogs primarily under contracts but also sell finished hogs in the cash market to ensure that a sufficient number of hogs are sold in the cash market because payment formulas are based on the average price in those markets.

In the corresponding purchases or procurement of finished hogs by packers, hog packers noted a variety of reasons for using particular marketing arrangements. In particular, based on the industry discussions, hog packers might

- use a combination of production contracts, marketing agreements, and production on company-owned farms because it would be otherwise difficult to obtain a sufficient supply of hogs in geographic areas where plants are located;
- use production contracts and marketing agreements to ensure food safety, consistency of raw material to meet customer needs, and compliance with certification program requirements;
- purchase hogs on the spot market when hogs are needed to fill plant capacity even though most procurement needs are raised on company-owned farms;
- use hogs from both company-owned farms and production contracts because these methods provide the ability to procure lean, consistent hogs;
- use marketing contracts that require producers to use the packer's lines of hog genetics;
- use the cash market exclusively—including through buying stations, dealers, and direct trade—because they do not have the capacity to handle being locked into contracts and believe the spot market offers more flexibility;

- use only the cash market to avoid dealing with contracts especially for buying “outs” and culls that are slaughtered to serve particular markets;
- use almost every possible type of marketing arrangement for the flexibility it allows;
- use a mixture of spot market purchases, contracts, and company-owned hogs to be able to respond to changes in customer requirements;
- use contracts to ensure that hogs meet the level of quality required by customers; and
- use a portfolio of procurement methods because at any given point in the cycle, some methods will be better than others and this helps manage risk.

Finally, on the sales side, the reasons for using particular types of marketing arrangements were less specific. Packers that used a wide variety of arrangements and those that used only the cash or spot market said the methods they used were traditional methods and they found these methods worked for them. They felt the methods they used allowed them to meet customers’ needs and were the most cost-effective.

Note that, in addition to the stated reasons discussed in this section, in later parts of the study, we will analyze reasons for using alternative marketing arrangements that are related to price differences, production cost differences, quality differences, and risk shifting. We will conduct these analyses using data from the industry surveys and from the transactions data collection.

4.3.5 Summary Information about Marketing Behavior in the Hog and Pork Industries

Based on the discussion above, some of the unique characteristics of the pork industry that will affect methods of analyzing marketing arrangements in this industry are as follows:

- Industry procurement practices can be best characterized as portfolios of various arrangements including spot markets, production contracts, marketing contracts, and production of livestock on company-owned farms. The reasons for diversified procurement and marketing portfolios include price and market access risk management, quantity and quality assurances, and maintenance of market flexibility.

- There seems to be a general tendency away from cash or spot market participation towards more advanced types of marketing arrangements with yet unclear effects on producers, packers, and consumers.
- Individual marketing arrangement choices seem to be interdependent with other marketing decisions in the sense that different methods seem to exhibit significant complementarities. In other words, a decision to increase the level of one activity raises the profitability of any increases in the levels of other complementary activities. Therefore, high use of marketing contracts may go together with the high use of production contracts.
- Production contracts exhibit a high degree of uniformity when it comes to division of responsibilities for providing production inputs and a fair amount of diversity when it comes to the specification of grower payment mechanisms. The packer (principal) always owns animals and feed, and the grower (agent) always provides housing facilities and labor. The remuneration schemes vary from high-powered incentives (e.g., variable piece rates with bonuses and penalties) to extremely low-powered schemes (e.g., fixed payments per square foot of the housing facilities).
- Marketing contracts exhibit great variation in terms of pricing methods, valuation methods, and other specific contract provisions. The most frequently observed type of marketing contract is one in which compensation is based on the Iowa-Minnesota live hog price or a carcass price with premiums or discounts based on a carcass pricing grid and with standards for minimum live or carcass weight, minimum quality requirements, and some element of price risk management.
- More recent developments in marketing contract design seem to indicate a very gradual but consistent shift toward requirements for more uniform production practices with a declining emphasis on the carcass merit. The main reason for this shift is mainly caused by difficulties associated with measuring PSE indicators.

The characteristics listed above may need to be accounted for in the analyses conducted in later parts of the study. In addition to the type of marketing arrangement and the characteristics of the marketing arrangement, the characteristics of the products traded will need to be accounted for in future analyses for the study. Table 4-17 outlines these other characteristics of transactions for procurement of finished

Table 4-17. Characteristics of Hogs and Pork Identified in Procurement and Sales Transactions

A purchase transaction is defined as the purchase of a lot of hogs, and a sales transaction is defined as the sale of a specific type of raw or processed pork product.

Characteristic	Description
<i>Pork Packer Procurement</i>	
Quantity/Condition/Type	
Number of head	Number of live hogs delivered in the lot
Liveweight	Total liveweight of the lot
Hot weight	Total hot weight of the lot (carcass weight or dressed weight)
Condemned	Number of condemned and dead hogs in the lot
Barrows and gilts	Number of combined barrows and gilts in the lot
Sows	Number of sows in the lot
Boars and stags	Number of combined boars and stags in the lot
Off quality	Number of off quality hogs in the lot (e.g., PSE)
Quality and Uniformity	
Lean percentage	Average lean percentage for the lot
Back fat	Average back fat measurement for the lot
Loin eye depth	Average loin eye depth for the lot
FFLI	Average Fat Free Lean Index (FFLI) for the lot
Assessed sort loss	Number of head in lot discounted because of weight
Other Value Characteristics	
Branded/certification	Number of head in the lot that were eligible for branded or certification program
Program name	Name of branded or certification program(s)
<i>Pork Packer Sales</i>	
Quantity/Type	
Total weight	Total weight of pork product in pounds for the transaction
Product code	Product code as defined by seller (if defined differently than IMPS code)
Product name	Pork product name
Level of Fabrication/Processing	
Product classification	Pork product was classified as a carcass or quarter, primal cut, subprimal cut, ground (including trimmings), portion cut, case ready, fresh processed, RTE, or other product.
Trim level	Pork product fat was trimmed to 3/4 inch (19 mm), 1/4 inch (6 mm), 1/8 inch (3 mm), practically free, peeled/denuded, or peeled/denuded (surface membrane removed)
Fat content	Percentage of fat content for ground pork and trimmings
Tenderization	Pork product was tenderized or marinated

(continued)

Table 4-17. Characteristics of Hogs and Pork Identified in Procurement and Sales Transactions (continued)

Characteristic	Description
Level of Fabrication/Processing (continued)	
Added ingredients	Pork product had added ingredients
Refrigeration	Pork product was chilled/fresh, frozen, or other
Packaging	Pork product was packaged in vacuum packaging, gas packaging, paper, combo bins, or other
Other Value Characteristics	
Branded	Pork product was produced and marketed under a corporate trademark or one of USDA's certified programs
Other certification	Pork product had another type of certification

Note: IMPS = Institutional Meat Purchase Specifications.

hogs by packers and sales of pork products. In later parts of the study, we will collect data on these fields as part of the transactions data collection. These fields will allow us to address quality differences and price differences associated with alternative marketing arrangements. Also, analyses of these data will provide more objective evidence regarding the use, terms, and reasons for the use of alternative marketing arrangements in the hog industry.

4.4 LAMB PRODUCERS, PACKERS, AND BREAKERS

Lamb and lamb meat markets are relatively informal, with few transactions occurring under formal contracts.

As discussed in Section 2, the lamb industry is substantially smaller in terms of volumes traded compared to the beef and pork industries. Lamb and lamb meat markets are relatively informal, with few transactions occurring under formal contracts. However, the lamb industry exhibits three characteristics that are relatively unique compared to the beef and pork industries:

- Purchase and sales of products are in many cases coordinated through producer-owned cooperatives that slaughter, process, and market product on the behalf of the producer-owners.
- Custom lamb slaughter is common, with some of the largest packers slaughtering a large proportion of their volume on a per-head fee basis.

- Most lamb-processing activities occur in separate breaker plants that break down carcasses into lamb cuts and processed lamb products.

In the sections below, we present the descriptive findings on type and classification of alternative marketing arrangements; terms used in alternative marketing arrangements; availability of alternative marketing arrangements; reasons for use of alternative marketing arrangements; and, finally, other information needed to understand marketing arrangements in the lamb and lamb meat markets.

4.4.1 Types and Classification of Spot and Alternative Marketing Arrangements Used in the Lambs and Lamb Meat Industries

Table 4-18 presents the types of lambs and lamb products sold and the types of buyers for each. Young lambs are generally sold to feedlots as feeder lambs, but they may also be slaughtered at young ages for sale in specialty (including ethnic) markets. Fed lambs are sold or transferred to packers for slaughter. Some lamb carcasses are fabricated at a packing plant, but it is also common for lamb carcasses to be shipped to a separate breaker plant for fabrication and processing. Once lamb meat products are produced, the general categories of products and buyers of those products are similar to beef and pork. However, lamb in many cases is treated as a specialty (or niche) product rather than a core meat product.

For lamb producers or feeders, the types of sales (or transfer) transactions are as follows:

- feeder lambs to feedlots,
- young (unfed) lambs to packers for seasonal or specialty markets, and
- fed lambs to packers for standard markets.

Figure 4-4 illustrates the types of marketing arrangements used for sale of feeder lambs by producers to feedlots and for sale of fed lambs by producers or feedlots to lamb packers. The types of marketing arrangements for direct sales of young lambs for seasonal or specialty markets to packers are represented by the same types of general types of arrangements, but sales are mostly from lamb producers directly to packers.

Table 4-18. Animals and Products Traded in the Lambs and Lamb Meat Industry

Two ages of lamb and various lamb products are traded in the industry.

Animal or Product	Buyer(s) ^a
Feeder lambs (50 to 90 pounds)	Lamb feedlot Packer for feeding
Fed lambs (110 to 130 pounds)	Packer
Lamb carcasses and saddles	Breaker
Lamb primal cuts Lamb subprimal cuts	Processor
Ground lamb	Processor Wholesaler Food service operator Grocery retailer
Lamb portion cuts Fresh processed lamb	Wholesaler Food service operator Grocery retailer
Case-ready lamb	Wholesaler Grocery retailer

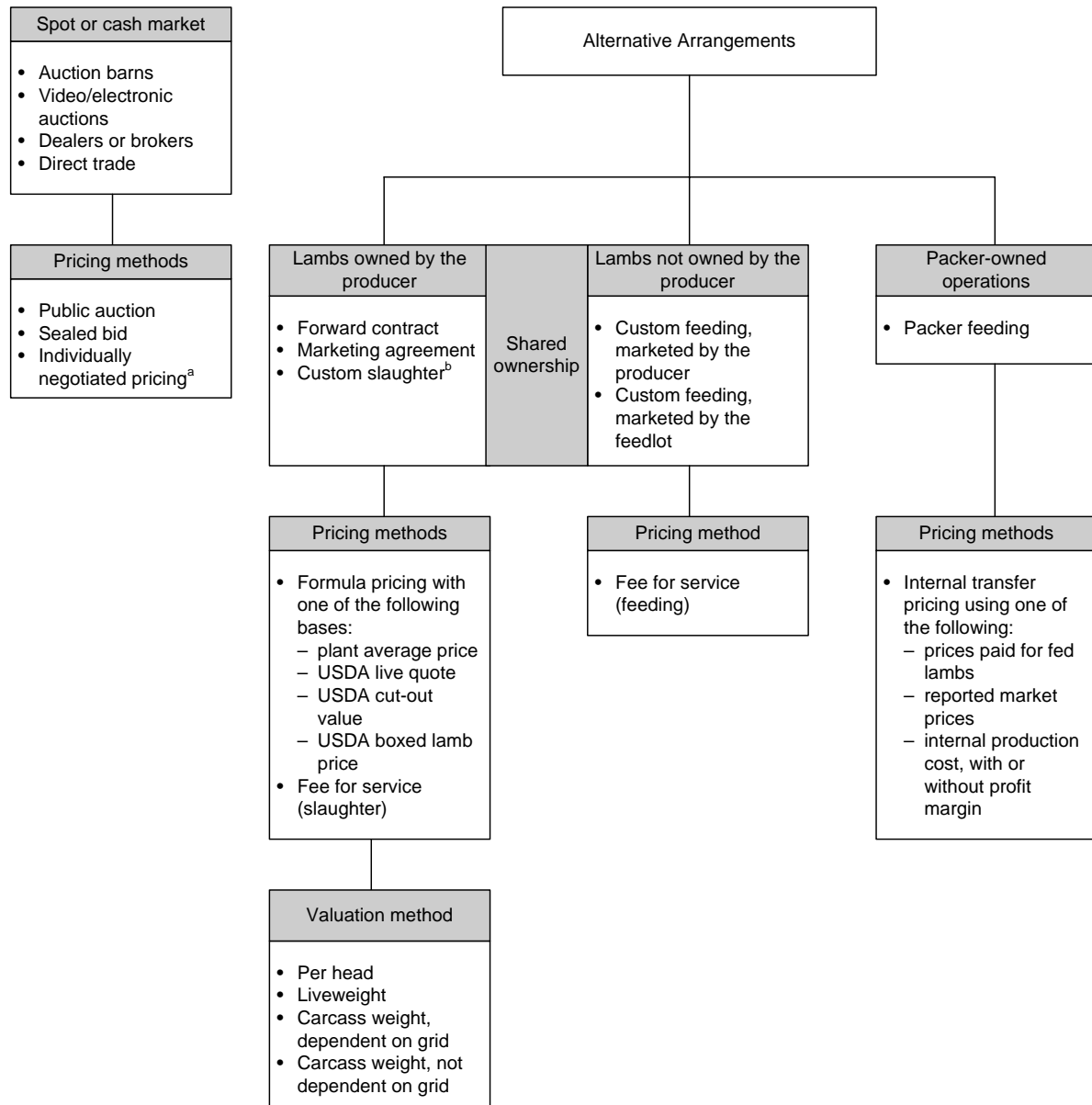
^aIn the lamb industry, purchases and sales of products are often coordinated through producer-owned cooperatives.

As indicated in Figure 4-4, the key dimensions of marketing arrangements at each stage include the **ownership method** for the animal or product while it is at the establishment (e.g., sole ownership, shared ownership, or owned by another entity) and the **pricing method** used. If formula pricing is used, a **formula base price** must also be specified. The **valuation method** for carcasses might be on a per-head basis or liveweight or carcass weight basis. Carcass weight valuation might be based on a grid that offers premiums or discounts based on weight range and carcass quality grade. If animals or products are shipped from one establishment to another owned by the same company, an **internal transfer pricing method** must also be specified.

Lamb producers produce feeder lambs from breeding stock and sell them to lamb feeders. However, some lamb feeders produce their own feeder lambs in addition to purchasing feeder lambs from lamb producers. In the West, it is more likely that feeder lambs are produced and sold to feedlots for feeding prior to slaughter. In the Midwest and East, it is more likely that lambs are produced and fed on one operation prior to shipment for slaughter. Lambs are generally fed for 4 to 8 weeks prior to

Figure 4-4. Marketing Arrangements for Sale or Transfer of Feeder and Fed Lambs by Lamb Producers

Different types of pricing methods are associated with each type of marketing arrangement used in the industry.



^aIndividually negotiated pricing is often benchmarked against reported prices.

^bCustom slaughter may be coordinated by a cooperative that schedules slaughter of lambs for its producer-members.

slaughter. When purchasing feeder lambs, a lamb feedlot might purchase lambs at auction, directly from a feeder lamb producer under a spot arrangement, or under a forward contract. Lamb feedlots sell fed lambs to packers through direct trade, informal or formal marketing agreements, and forward contracts. When using direct trade, lamb feeders may ship

lambs to a buying station operated by a packer. Smaller producers are more likely to use auctions and buying stations, and larger producers are more likely to negotiate directly with packers.

Lambs in feedlots might be owned

- by a lamb producer, in which case the feedlot custom feeds lambs for the producer;
- jointly by a lamb producer and feedlot in a partner arrangement;
- by a lamb packer, in which case the feedlot custom feeds for the packer;
- jointly by a lamb packer and feedlot in a partner arrangement; and
- solely by a feedlot.

Auction purchases and direct trade are much more common than contractual relationships in the lamb industry.

Lamb packers purchase fed lambs directly, or they slaughter lambs on a fee-per-head (or custom) basis. When custom slaughtering, the packer does not take ownership of each lamb but instead receives a fee for slaughtering the lamb and producing the carcass for further processing. For purchases of fed lambs, marketing arrangements include auction purchases, individually negotiated direct trades with lamb producers and feeders, forward contracts, and marketing agreements. However, auction purchases and direct trade are much more common than contractual relationships in the lamb industry. Packers often have established relationships with lamb producers and feeders under which they purchase lambs on an ongoing basis but have formal contracts in place. Packers generally use a combination of marketing arrangements, including a mix of custom slaughter and purchases of lambs on their own account.

For lamb packers, the types of sales (or transfer) transactions are as follows:

- carcasses from small lambs sold to breakers or other downstream market participants for use in specialty markets,
- carcasses from standard-weight lambs sold to breakers or other downstream market participants for use in standard markets, and

- boxed lamb and processed lamb products (primal cuts, tray-ready, case-ready, and other products) sold to processors or downstream market participants.

Figure 4-2 presented in Section 4.2 shows the types of arrangements used for sales of carcasses and meat products by all species of meat packers including lamb. In addition to ownership method, pricing method, formula base, valuation method, and internal transfer pricing methods, **other pricing practices** might also be a key dimension of marketing arrangements for packer sales.

Different markets desire specific lamb cuts and products; thus, local breaker plants produce products tailored to local markets.

Some lamb packers fabricate carcasses and produce processed lamb products in the same facility in which the lamb was slaughtered. However, it is common in the lamb industry to sell or transfer lamb carcasses to breaker plants that perform these activities. Because of their smaller size, lamb carcasses can be shipped more easily than other livestock carcasses. Also, different markets desire specific lamb cuts and products; thus, local breaker plants produce products tailored to local markets.

Whether lamb packers are selling carcasses, cuts, or processed products, the types of sales transactions they use are similar. They generally have informal relationships with their buyers in which they anticipate some level of weekly orders. In some cases, they may have established marketing agreements with breakers or with distributors that purchase product for retail grocery and food service sales.

4.4.2 Terms Used in Spot and Alternative Marketing Arrangements in the Lamb and Lamb Meat Industries

As listed in Section 4.1, several types of key terms define marketing arrangements in the livestock and meat industries. Below, we describe preliminary findings regarding the use of these terms for sales of feeder and fed lambs and for sales of lamb carcasses and lamb products.

Key Terms in Sales of Feeder and Fed Lambs

Based on discussions with lamb producers and lamb feedlots, marketing arrangements for feeder lamb sales are generally oral unless the length of the arrangement covers more than a short period of time (i.e., more than a few months). Payment terms are generally per-head fixed amounts. Purchases at auction might be through a broker that acts on behalf of a lamb feedlot. Quality determination is based on visual inspection and

relies heavily on the characteristics of the sheep breed. Buyers desire feeder lambs that are in good condition for feeding and will produce high meat yields at slaughter. Direct trade negotiations are conducted a few days ahead of delivery, and negotiation of forward contracts occurs approximately 2 months ahead of delivery. Arrangements for scheduling and paying for delivery are part of the negotiation process, with price adjustments made according to which party is paying for transportation costs.

Based on discussions with lamb feedlots, short-term marketing arrangements for sales of fed lambs to packers are generally oral, but larger-volume and longer-term arrangements are likely to be written. Written contracts might have short durations of only 1 year and often offer flexibility in terms of delivery timing and quantities. Lamb feeders might sell to a single buyer (packer or other intermediary) or multiple buyers depending on the geographic location of the feedlot.

Although some shipping distances might be relatively short, fed lambs are commonly shipped as much as 1,000 to 1,200 miles to a specific buyer for slaughter.

Although some shipping distances might be relatively short, fed lambs are commonly shipped as much as 1,000 to 1,200 miles to a specific buyer for slaughter. Fed lambs sold at auction are shipped shorter distances in the range of a 1- to 2-hour drive from the operation. Auction commissions range from \$3 to \$4 per head. Auctions typically operate once or twice per week for sales of lambs. No commissions are paid for the other methods.

Purchases of fed lambs by packers represent the opposite side of the transactions for sales of lambs by feedlots. Based on discussions with lamb packers, most alternative marketing arrangements for the purchase of lambs by packers are oral arrangements. Packers noted that they have written uniform marketing agreements with producers or purchase agreements that extend for more than a year or are indefinite. In most cases, these agreements are fairly informal. Arrangements generally specify a quantity for delivery, but the specific quantity delivered is flexible. Quality requirements, such as weight range and yield grade, are generally specified but somewhat loosely enforced. Some packers noted that they previously or currently offer premiums for high-quality, lean lambs because overweight lambs cost more to process; however, not all packers do this because of concerns that quality determination might have been too subjective. A technology similar to the Fat-O-Meat'er used for hogs is

Lamb quality for determining payments is based on visual inspection of lambs prior to slaughter or on carcass quality after slaughter.

currently being developed for lambs so that premiums and discounts for lamb quality can be determined more objectively.

Lamb quality for determining payments is based on visual inspection of lambs prior to slaughter or on carcass quality after slaughter. When quality is based on visual inspection of the live animal, payments might be made on a per-head basis (more common for smaller size lambs) or per pound liveweight. In the lamb industry, one method of payment on a liveweight basis is called “double the dress.” This means that the producer is paid two times the price per pound of carcass or dressed weight (assumes a 50 percent dressing percentage). When quality determination is based on carcass quality, payments are determined from a grid that considers carcass (or rail) weight and yield grade. Carcasses are discounted for being too large or having an undesirable yield grade. Carcasses that receive the highest prices are generally 55 to 75 pounds and YG 2 or 3. Lambs that are heavy, old (classified as mutton), or YG 5 are heavily discounted. Producers may also be paid a pelt credit equivalent to approximately 10 percent of the value of the lamb.

In negotiating prices for individual transactions, publicly reported prices (e.g., USDA-reported prices or local auction prices) are usually the starting place for negotiations.

In negotiating prices for individual transactions, publicly reported prices (e.g., USDA-reported prices or local auction prices) are usually the starting place for negotiations. These prices might be adjusted depending on the condition of lambs and the seller’s reputation for providing higher-quality lambs. Base prices for formula calculations and grids are based on USDA-reported prices under mandatory price reporting (MPR) or prices at specific auctions. Information on lamb quality is passed back to producers if payments are based on carcass quality. Specific types of information might include hot weight of the carcass, pay weight of the carcass (after chilling), yield grade, quality grade, average pelt credit, and average offal credit.

Arrangements for lamb delivery are generally made 1 to 2 weeks in advance of slaughter. However, packers are in contact with lamb feeders 30 to 60 days ahead of slaughter to plan procurement schedules. Lamb feeders incur delivery costs if they sell at auction or deliver lambs to the slaughter plant. In some cases, the packer picks up lambs and thus incurs the costs of transportation. If lambs are custom slaughtered, the lamb owner delivers lambs to a packer and then arranges for

delivery of carcasses from the packer to a breaker plant following slaughter. Because of the informal nature of the marketing arrangements used in the lamb industry, formal terms for terminating arrangements or resolving disputes are not generally specified.

If a packing plant is owned by a cooperative (or slaughter is coordinated on a custom basis by a cooperative), the number of lambs delivered for slaughter is based on the number of cooperative shares owned by each producer. In this case, marketing arrangements are more formal and documented in a contract.

Key Sales Terms of Sales of Lamb Carcasses and Cuts by Packers and Breakers

The terms of sales transactions for carcasses, cuts, or processed products sold by lamb packers are similar to those for other types of meat. Most marketing arrangements are oral. Lamb buyers generally specify quantity requirements, but quality requirements are based primarily on a packer's reputation for supplying high-quality and consistent product in the past. Price negotiations start from price lists that may be held fairly constant except for seasonal fluctuations (e.g., Easter holiday) or adjusted frequently based on prices reported under MPR. Some carcasses might be discounted for YG 5 carcasses or excessive weight shrinkage during shipment (e.g., more than 2 percent). In addition, packers might offer discounts to retailers to facilitate sales or promotions of lamb in retail stores.

Sales arrangements are made from as little as 1 day to several months prior to delivery. However, most arrangements are made 2 to 4 weeks prior to delivery except for holiday sales and special promotions. For these special occasions, sales arrangements might be made 2 to 3 months prior to delivery. The longest types of sales arrangements are only 6 months in length. Lamb packers generally ship to purchasers using their own trucks or a commercial carrier's truck. In some cases, buyers will pick up directly from the packer. Packers may offer discounts on shipping costs if buyers purchase an entire truckload. Because of the informal nature of the sales arrangements used, termination options or dispute resolution mechanisms are not specified.

4.4.3 Availability of Alternative Marketing Arrangements to Lamb Industry Participants

Specific alternative marketing arrangements might or might not be available to market participants based on a number of factors. Some of the general factors that might affect availability of particular types of arrangements include the relative sizes of the establishment if buyers need large product volumes and the distance required for transportation of livestock and products. Other specific factors affect availability for both buyers and sellers. In discussions with lamb producers and feeders, limitations in availability of particular arrangements were noted in some cases. For example, lamb producers that would like to sell lamb carcasses and products directly to consumers might not be able to do so if a USDA-inspected slaughter establishment is not within a reasonable distance. If producers have to ship lambs long distances for slaughter and then ship lamb products back to customers, this type of arrangement might not be feasible. In addition, lamb feeders that would like to receive premiums based on quality grading of lamb carcasses might not be able to if local packers only offer liveweight basis pricing.

Some lamb producers noted plans to build feedlots that would allow their operations to feed out lambs and then sell fed lambs to packers. By combining both stages of production, lamb producers believe their operations may be better able to tailor their products to specific markets. However, in general, most lamb producers and feeders we interviewed expect no changes in the near future because prices have been high. As with other types of livestock production, lamb producers tend not to make changes in types of marketing arrangements used when prices are high.

The lamb industry has excess slaughter capacity; thus, producers face little risk of not being able to sell lambs when they are ready for market.

In discussions with lamb packers, availability of particular types of arrangements for purchasing fed lambs appears to be affected by current conditions in the lamb market. Lamb packers believe that lamb producers and feeders are reluctant to enter into contracting relationships because market prices have been high. The lamb industry has excess slaughter capacity; thus, producers face little risk of not being able to sell lambs when they are ready for market. Furthermore, lamb packers cannot require that all lambs meet certain quality specifications if they are trying to use available slaughter capacity. During the discussions, packers said that slaughter

capacity exceeds fed lamb production because the number of lambs produced has declined. The reasons for the decline include loss of the wool incentive program, drought in some regions of the country, and low prices in previous periods that drove some farms out of business.

Some market participants believe fundamental changes in the lamb market must occur.

In the future, lamb packers expect few changes in the types of marketing arrangements used for purchases unless the markets change (specifically, if more fed lambs become available on the market). However, lamb packers serving particular specialty markets expect few changes in the use of marketing arrangements even if the lamb market changes in the future. Serving these markets often requires a high level of involvement in lamb selection and this will likely not change. Some market participants believe fundamental changes in the lamb market must occur. These include getting lamb growers to be more organized and business oriented, improving the consistency and quality of lamb supply, and becoming more involved in "marketing against imports."

On the sales side, packers that do not currently participate in direct marketing activities stated a desire to begin these types of activities. In particular, they would like to use trade shows and Web sites as marketing tools and be able to enter into forward contracts with buyers to secure prices for lamb products.

4.4.4 Specific Reasons Lamb Industry Participants Enter into Marketing Arrangements

In Section 4.1, we introduced some general reasons why market participants might use only the cash or spot market or might use alternative marketing arrangements. In this section, we describe reasons given during discussions with industry participants. One recurring theme in these discussions was a desire to maintain positive relationships with buyers or sellers even when the relationship meant using a type of marketing arrangement that was not the most advantageous at the moment.

Some of the specific reasons mentioned by lamb producers and feeders for using particular types of marketing arrangements were as follows:

- use forward contracts to allow prices paid for feeder lambs to "stay closer" to prices received for fed lambs,

- use arrangements in which pricing is based on a grid to obtain higher prices for higher-yielding lambs,
- avoid use of auctions because of the belief that “auctions are not stable enough,”
- avoid selling to particular packers that require agreements that would result in supplies being “held captive,”
- use cooperative arrangements with other producers to avoid difficulties in getting lambs slaughtered at the appropriate time (that is, before lambs are too heavy or too old), and
- use contracts with a packer to reduce time involved for selling fed lambs.

In the corresponding purchases of fed lambs by packers, some of the reasons noted by packers for using particular marketing arrangements were as follows:

- believe few options other than the current arrangements are available, although the result is difficulty at times in meeting buyer requirements for specific quality of lambs (e.g., consistency in size, low levels of fat);
- have found lamb growers reluctant to enter into contracting arrangements and therefore have relied on cash or spot market purchases;
- have a need to manage supply closely on an ongoing basis especially given the large proportion of custom slaughter conducted; and
- have become involved in purchasing and contracting slaughter of lambs to meet demand from gourmet restaurants for particular types of lamb.

Finally, some of the reasons noted by lamb packers for using particular types of marketing arrangements for lamb product sales are as follows:

- have developed methods over time and found them to be the most practical given the current market structure,
- prefer more formal contracts for product sales but have found it difficult to set these up,
- offer assurances they will be able to sell carcasses produced from lambs (prices for fresh lamb products are much higher than for frozen lamb; thus, the desire is to sell as much product as possible as fresh lamb), and

- offer the ability to meet specific specialty market requirements and thus are the only practical methods available.

In addition to the stated reasons discussed in this section, we will analyze reasons for using alternative marketing arrangements that are related to price differences, production cost differences, quality differences, and risk shifting in later parts of the study. We will conduct these analyses using data from the industry surveys and from the transactions data collection.

4.4.5 Summary Information about Marketing Behavior in the Lamb and Lamb Meat Industries

Based on the discussion above, some of the unique characteristics of the lamb industry that likely affect analyses of marketing arrangements in the lamb industry are as follows:

- Quantities of lamb consumed in the United States are small and markets tend to be geographically dispersed.
- Because of current excess lamb slaughter capacity, lamb packers cannot always obtain the quality of lambs they desire.
- Lamb products are often produced to meet specific needs of specialty markets.
- Many producer-owned cooperatives slaughter and process lambs.
- A high volume of lambs are slaughtered on a custom basis without the packer taking ownership of the lambs.
- A high proportion of lamb carcasses are shipped (sometimes long distances) for processing in breaker plants.
- Most transactions are either cash market transactions or relatively informal types of marketing arrangements.

The characteristics listed above may need to be accounted for in the analyses conducted in later parts of the study. In addition to the type of marketing arrangement and the characteristics of the marketing arrangement, the characteristics of the products traded will need to be accounted for in future analyses for the study. Table 4-19 outlines these other characteristics of transactions for procurement of fed lambs by packers and sales of lamb products. In later parts of the study, we will collect data on these fields as part of the transactions data collection. These fields will allow us to

Table 4-19. Characteristics of Lambs and Lamb Meat Identified in Procurement and Sales Transactions

A purchase transaction is defined as the purchase of a pen/lot of lambs, and a sales transaction is defined as the sale of a specific type of raw or processed lamb product.

Characteristic	Description
<i>Lamb Packer Procurement</i>	
Quantity/Condition/Type	
Number of head	Number of live lambs and yearling lambs delivered in the lot
Liveweight	Net live or actual purchase weight for the lot (equal to gross liveweight minus shrink)
Hot weight	Total hot weight of the lot (carcass weight or dressed weight)
Condemned	Number of condemned and dead lambs and yearling lambs in the lot
Lambs	Number of lambs and yearling lambs in the lot
Mutton	Number of ewes and rams in the lot
Quality and Uniformity	
Quality grade	Number of head in the lot that were carcass grade Prime, Choice, Good, Utility, or Other (not graded)
Yield grade	Number of head in the lot that were carcass yield grade 1, 2, 3, 4, 5, or other
Heavy weight	Number of head in the lot that were classified heavy weight
Light weight	Number of head in the lot that were classified light weight
Other Value Characteristics	
Branded/certification	Number of head in the lot that were eligible for branded or certification program (including Kosher and Halal)
<i>Lamb Packer Sales</i>	
Quantity/Type	
Total weight	Total weight of lamb product in pounds for the transaction
Product code	Product code as defined by seller (if defined differently than IMPS code)
Product name	Lamb product name
Quality	
Quality grade	Lamb product quality grade was Prime, Choice, Good, Utility, or Other (not graded)
Yield grade	Lamb product yield grade was 1, 2, 3, 4, 5, or other
Level of Fabrication/Processing	
Product classification	Lamb product was classified as a carcass or saddle, primal cut, subprimal cut, ground (including trimmings), portion cut, case ready, fresh processed, RTE, or other product.
Trim level	Lamb product fat was trimmed to 1/4 inch (6 mm), 1/8 inch (3 mm), practically free, peeled/denuded, or peeled/denuded (surface membrane removed)
Fat content	Percentage of fat content for ground lamb and trimmings

(continued)

Table 4-19. Characteristics of Lambs and Lamb Meat Identified in Procurement and Sales Transactions (continued)

Characteristic	Description
Level of Fabrication/Processing (continued)	
Tenderization	Lamb product was tenderized or marinated
Added ingredients	Lamb product had added ingredients
Refrigeration	Lamb product was chilled/fresh, frozen, or other
Packaging	Lamb product was packaged in vacuum packaging, gas packaging, paper, combo bin, or other
Other Value Characteristics	
Branded	Lamb product was produced and marketed under a corporate trademark or one of USDA's certified programs
Other certification	Lamb product had another type of certification (including Kosher and Halal)

Note: IMPS = Institutional Meat Purchase Specifications.

address quality differences and price differences associated with alternative marketing arrangements. Also, analyses of these data will provide more objective evidence regarding the use, terms, and reasons for the use of alternative marketing arrangements in the lamb industry.

4.5 DOWNSTREAM INDUSTRIES—FOOD SERVICE OPERATORS AND RETAILERS

The competitive threat of WalMart and the other discount retailers such as Costco that have added retail food sales to their stores has been the catalyst for a wave of consolidations in grocery retailing that has resulted in the emergence of very large retail groups. At the same time, meals consumed away from home and meals that are prepared outside the home for consumption at home are increasing dramatically. Large food service chains are continuing to gain market share, and retailers are becoming so large that they are now able to influence terms and arrangements upstream through the supply chain back to the farm level.

The increase in branded meat programs exemplifies the meat industry's response to changing consumer demands. Branded meat programs emphasize different product attributes, such as breed, production methods, health, and eating quality, and are generally positioned at a higher quality level than unbranded

Interestingly, the interviews conducted suggest that retailers have conflicting incentives regarding branding programs because they fear the loss of flexibility.

products. Interestingly, the interviews conducted suggest that retailers have conflicting incentives regarding branding programs because they fear the loss of flexibility. Nevertheless, changing consumer demands are pushing branded products to retailers. This push appears to typically come from a perceived desire by producers, feeders, and packers of downstream customers for a quality meat product. Quite often, feeders and producers noted the shift in consumer preferences for a more consistent, quality product, which in turn has led to increases in value-added and branded programs with hopes of capturing consumer satisfaction and brand loyalty.

Further, some retailers are maintaining a commodity meat position to maintain this flexibility with the objective of capturing market or price opportunities. These retailers also state that a significant portion of fresh meat sales are priced with zero to low profit margins to attract customers into the store where those customers will likely purchase other higher-profit items. Offering to sell featured meat items at discounts generates significant customer volume and profitability through sales of other goods.

4.5.1 Types and Classification of Spot and Alternative Marketing Arrangements Used in the Downstream Industries

The marketing arrangements used by the downstream meat industries for the purchase of carcasses, meat cuts, bacon, hamburger, precooked products, and case ready products are

- spot markets,
- forward contracts, and
- marketing agreements.

The firms interviewed all use written contracts for some portion of purchases and purchase meat from one or more of the major packers. It is believed that purchasing from a number of packers provides additional flexibility and ensures that purchasers receive a competitive price. There also appears to be a strong desire to improve risk management methods by all downstream participants.

Across alternative marketing arrangements, some reasons for why distributors, grocery retailers, and food service companies use their current alternatives include the following:

- provide the ability to purchase at lower prices;

- promote long-term business relationships;
- reduce risk exposure;
- reduce costs of activities for buying and selling;
- reduce price variability;
- increase supply chain information;
- allow for food safety or biosecurity assurances;
- allow for product traceability;
- improve scheduling, timing, and overall predictability;
- ensure higher quality and consistency of meat; and
- ensure availability of desired quantities.

Buyers tended to use a combination of contracts and spot or cash market transactions. Reasons for using the spot market include the following:

- provides the flexibility to adjust purchases quickly in response to changes in market conditions,
- does not require identifying and recruiting long-term contracting partners,
- does not require managing complex and costly contracts, and
- enhances ability to benefit from favorable market conditions.

4.5.2 Terms Used in Spot and Alternative Marketing Arrangements in the Downstream Industries

In this section, we describe preliminary findings regarding the use of specific terms for sales of meat and meat products. Contracts are written and vary in terms of length from participant to participant, ranging from 3 months to 5 years depending on the product. Specials and features of meat products are planned 4 to 8 weeks in advance. Meat purchasers for consumer markets design a product feature by starting negotiations with processors, offer the feature to member or firm stores with an acceptance deadline, and complete the negotiations with the processor or processors after the deadline. The length of arrangement also seems to be specific to the buying organization. Some businesses make quarter-to-quarter decisions, and some businesses are looking for long-term arrangements.

Increasingly, purchasers of meat products are using electronic and Web-based procurement systems.

Increasingly, purchasers of meat products are using electronic and Web-based procurement systems. These systems list a desired volume of meat and a maximum price. Processor sales forces are able to bid on the order with the low bid receiving the order. If the quantity associated with the low bid cannot fill the complete order, then the second lowest bid will be accepted, as will additional higher bids until the order is filled. The listed order has a delivery time period, and the order "auction" itself may expire after a certain time period.

Food service makes extensive use of flat price forward contracts.

Food service makes extensive use of flat price forward contracts. There is some basis contracting and some ratio hedging to protect the value of the position.¹⁰ However, CME futures contracts are significantly less correlated with meat products than livestock, and this is recognized and deemed a problem by market participants because it reduces the effectiveness of the hedge. Flat price contracts recognize the relative risks, with the party subject to more risk commanding a premium. Contracts are 1 month to 1 year in length with the majority being one to two quarters in length. Meat sellers are reluctant to forward contract longer than 6 months given the imperfect correlation with risk-reducing instruments and the lack of liquidity of these more distant futures contracts.

Retailers noted that they would be willing to pay a "little bit" more for higher quality. This comports with findings related to consumer's willingness to pay as well as the price spreads between Choice and Select for graded meat. Also, there appear to be no slotting fees paid for meat.

4.5.3 Availability of Alternative Marketing Arrangements to Downstream Market Participants

Small purchases tend to be made on the spot market, and large purchases tend to employ forward contracts or formula pricing. The exception is sales and specials or features that retail grocery stores provide as a normal part of marketing. These transactions are usually spot market transactions and can be very large volumes.

Formula pricing is very common in meat transactions. All types of meat purchasers, from large retailers to relatively smaller

¹⁰With ratio hedging, the hedger establishes a position in the futures market for livestock that is different from the position held in the cash market for meat where the number of options purchased is determined by the ratio of value.

restaurant operations, use formula methods to procure meat from packers and processors. These transactions tend to be formula priced off the USDA-reported price for the specific cut. There is usually an overage or an adjustment to the price for other services, such as additional trimming, odd-volume purchases, and availability on short notice. Retailers tend to negotiate the formula once per month, quarter, or year. Formulas may be based on multiple prices. For example, ground beef is frequently formula priced off 50 percent lean beef trimmings and 90 percent lean beef trimmings. Trimmings are blended to produce ground beef of desirable fat content. The formula includes overages for the grinding service and added flavor profiles such as salt and other spices. Buyers of meat products tend to benchmark formula prices paid to one seller through comparisons with other market prices and competitive offers from other companies for the same or similar products.

Downstream firms using alternative marketing arrangements are of all sizes. Small and large firms use formula pricing and forward contracts. However, larger firms appear to be able to secure better terms. That is, there appears to be a volume-price trade-off that would be consistent with the consolidation strategy that grocery retailers are executing.

4.5.4 Specific Reasons Downstream Market Participants Enter into Marketing Arrangements

One recurring theme in these discussions was a desire to maintain positive long-term relationships with sellers even when the relationship meant using a type of marketing arrangement that was not the most advantageous at the moment in terms of cost.

In this section, we describe reasons for entering into marketing arrangements based on the discussions with industry participants. One recurring theme in these discussions was a desire to maintain positive long-term relationships with sellers even when the relationship meant using a type of marketing arrangement that was not the most advantageous at the moment in terms of cost. Retail and food service buyers also emphasized the need for better risk management tools. Interviewees also indicated that neither current risk management tools nor the relationship between meat prices and livestock futures is well understood.

It should be noted that a primary driver for the use of alternative marketing arrangements is the development of strong supply chain relationships that are based on loyalty and consistency over the long term. In addition, downstream industries use alternative marketing arrangements to manage

market volatility. Downstream industries rely on a predictable, steady stream of meat products and deliveries. Stable, predictable prices and volumes are essential to customer satisfaction and loyalty for downstream industries to maintain the consistency and quality of menu items and/or meat case inventories.

Participants noted that many of the procurement changes were due to changes in customer preferences. Some of the specific reasons mentioned for using particular types of marketing arrangements were the following:

- Forward contracts are used as a method to stabilize or control costs, improve timing and predictability, and manage overall market volatility.
- Quantity requirements are included based typically on quarterly projections of consumer demand.
- Strict quality considerations are extremely important, and all characteristics are regarded equally. If any fall out of line, the contract will be terminated. Requirements include such things as *E. coli* testing and animal handling procedures with specific measurable criteria.
- Quality measures employed tend to be based on customer feedback.
- Formula pricing is often used because of requirements for volume, quality, and timing. Furthermore, formula contracts are often long-term contracts executed with trusted business partners. This makes it easier to manage meat procurement, resulting in significantly lower labor costs.
- The marketing arrangement provides for increased product consistency.

Formula pricing appears to be the main method of transacting in downstream markets because formulas are common and easy to understand and manage. In addition, buyers know they are basically paying the market price less volume discounts plus additional services.

5

Summary and Conclusions

Over time, the variety, complexity, and use of alternative marketing arrangements have increased in the livestock and meat industries. Marketing arrangements refer to the methods by which livestock and meat are transferred through successive stages of production and marketing. A marketing arrangement also designates a method by which prices are determined for each individual transaction. The increased use of alternative marketing arrangements raises a number of questions about their effects on economic efficiency and on the distribution of the benefits and costs of livestock and meat production and consumption between producers and consumers.

In 2003, Congress allocated funds to GIPSA to conduct a broad study of the effects of alternative marketing arrangements in the livestock and meat industries.

In 2003, Congress allocated funds to GIPSA to conduct a broad study of the effects of alternative marketing arrangements in the livestock and meat industries. GIPSA developed the specific scope and objectives of the study, and RTI was awarded a contract to conduct the Livestock and Meat Marketing Study following a competitive bidding process.

The study examines the following species and meat types: fed cattle and beef, hogs and pork, and lambs and lamb meat. This report is preliminary and focuses on describing the methods used to transfer livestock and meat between stages of production and marketing, the terms of alternative marketing arrangements, and the reasons for using the cash or spot market or alternative marketing arrangements. The interim results presented are based on an assessment of the livestock and meat industries, a review of the literature, information obtained during development and pretesting of the data collection instruments to be fielded later, and interviews with

selected trade associations and industry participants. After the industry surveys are fielded and transactions and profit and loss data are collected, the study team will conduct quantitative analyses to address the study questions. Subsequently, the information in this report will be further refined and developed and presented in a final report.

5.1 ISSUES AND TRENDS IN THE LIVESTOCK AND MEAT INDUSTRIES

The study addresses the following groups of industry participants:

- livestock producers and feeders
 - fed cattle and beef
 - hogs and pork
 - lambs and lamb meat
- meat packers and processors (or breakers)
- downstream suppliers
 - wholesalers and distributors
 - exporters
 - food service or restaurant establishments
 - retail establishments

Cattle, hogs, and lambs are usually produced on separate types of farms at various locations across multiple operations (e.g., breeder operations, feeder operations, and finishing operations). Livestock ready for marketing are slaughtered at establishments that usually are large and specialize in one livestock species; establishments that slaughter multiple species are typically smaller operations. Carcasses and cuts from animals slaughtered may be shipped to processing establishments for making meat products that may involve combining meat from different species. Most slaughter facilities are combined with fabrication facilities that process carcasses into boxed meat products that are vacuum-sealed in plastic and packaged in boxes for sale to retail establishments. Most carcasses are quality graded and yield graded by USDA's Agricultural Marketing Service, and federal inspection by USDA's Food Safety and Inspection Service is required for interstate shipment. After processing, meat products are distributed through wholesalers or directly to exporters, food service establishments, and retailers.

Vertical integration and marketing arrangements often combine multiple stages of production of meat products. The structure of production and processing, final demand for meat products, structure of input and output markets, and types of marketing arrangements used differ substantially across livestock species and meat type. COOL and the NAIS are recent legislation likely to have a dramatic effect on the beef, pork, and lamb industries.

5.1.1 Issues and Trends in the Fed Cattle and Beef Industries

Banning of cattle imports from Canada, because of the discovery of BSE, has resulted in tightening of cattle supplies within the United States, but reduced exports of beef to Japan and other Asian countries. Per capita domestic consumption of

beef, while declining from 1980 to 1999, has been stable to increasing since then. The stage of the cattle cycle was liquidation in 2003 to 2004 and has now entered the rebuilding stage. Cattle prices steadily declined until recent years; since 2002 real prices have increased substantially. Decreased numbers of cattle traded on traditional spot markets have spurred debate about price discovery and determination. Many of the prices published under Mandatory Price Reporting are used as base prices for formula pricing in numerous types of marketing arrangements.

The dominant system for cow-calf production is an outdoor cellulose-based feed production system. Calves are typically born in the spring and graze with the cow during the summer. Calves are weaned during the fall and then either enter confinement lots or pasture systems for additional growth. Yearlings or stocker cattle are then placed on spring pasture and sold in the fall as feeder cattle. Feeder cattle (animals entering feedlot in spring as yearlings or fall as feeder cattle) are fed a high-energy ration and then marketed as fed cattle to businesses that specialize in slaughter of live animals; production of beef carcasses, boxed beef, and case ready beef; and animal by-product processing.

Considerable diversity exists among cattle operations. Cow-calf operations may be single operations or may diversify into other ranching, haying, and other farming operations. Stocker cattle operations tend also to have joint operations with surplus forage. Cattle-feeding operations are often specialized, but a significant number are part of a larger enterprise that grows and manufactures feed.

Because of large land and resource base constraints, vertical coordination and integration in beef production do not occur by combining stages of production as in other livestock operations. However, beef producers have increased the level of vertical coordination through marketing arrangements, alliances, retained ownership, part-ownership, and/or partnerships with downstream producers and processors. Packers and processors have achieved coordination through part-ownership, partnerships, and profit sharing with other downstream producers and cow-calf operators. They also have alliances with some retailers and food service companies. Partnerships often provide financing or partial payments for animals.

Cattle production is widely dispersed across the United States. Cattle feeding is concentrated in the High Plains, Southern Plains, and Midwest. Because of proximity to cattle feeding, most of the meatpacking operations are located in the same regions as cattle feeding. Beef production operations at all stages are becoming larger. At the same time, the distribution of cow-calf operations and feedlot operations is becoming more bimodal, with a large number of operations with fewer than 50 head of cows. Cattle feeding has shifted steadily to the Great Plains over time with over 80 percent of operations in Colorado, Kansas, Nebraska, and Texas. Four meat packers slaughter and process over 80 percent of the fed cattle marketed in the United States. The United States is a net importer of both cattle and beef.

5.1.2 Issues and Trends in the Hog and Pork Industries

The hog and pork industries face environmental concerns related to concentrated animal feeding operations. Other issues relate to swine welfare assurance programs to ensure compliance with animal care practices, pork quality assurance programs to ensure compliance with food safety practices, and eradication of PRRS. The indirect effect of BSE in cattle has increased exports of pork to other countries substituting pork for beef, but elimination of antidumping duties on live hog imports from Canada has increased hog imports. Despite changes in production methods, prices continue to fluctuate across years. Multiyear price fluctuation is due to the hog cycle. The increased trend toward selling hogs based on carcass characteristics or merit basis has reduced the direct use of the live hog pricing system.

Historically, hogs were raised in farrow-to-finish operations on small diversified farms. Beginning in 1950s, many farmers adopted new technologies that allowed them to specialize in feed grain production. Hog production is now defined by specialized operations that use separate facilities for each stage of production.

The hog production stages are farrow-to-wean, wean-to-feed, and feed-to-finish. Market hogs are shipped to a packer where they are slaughtered, and then the carcasses are chilled and broken down into pork cuts. Fresh cuts are sold as boxed pork, much of which requires further processing before final

consumption. Packers also produce case-ready pork ready for sale to consumers.

Implementation of health safeguards allows hogs to be raised in high population densities. Segregated production facilities allow biosecurity and other concerns to be addressed. Facilities are designed to minimize the risks of disease by moving animals in and out of facilities on a batch basis so the facilities can be cleaned and sterilized between batches.

Hog production historically has centered in the Corn Belt States of Iowa, Illinois, Minnesota, Indiana, and Nebraska. Because feed costs are about 60 percent of production costs, hog producers are typically located close to the source of feed. Since 1990, the largest increases in hog production occurred in Utah, Oklahoma, Wyoming, and North Carolina. Many feeder pigs are supplied from nontraditional sources, including feeder pigs from Canada. The Corn Belt and Southeast are the major producing areas and also sell the most market hogs. As production has moved from the Corn Belt to the Southeast over time, so has slaughter capacity.

The total inventory of hogs and pigs has been relatively stable since 1990, but the number of pigs per litter has increased. Increases in average liveweights and carcass weights are driven in part by construction of larger slaughter facilities by packers to decrease per unit costs of production. In 2002, 558 federally inspected plants slaughtered at least 50 market hogs, but the four largest packers have slaughtered more than 50 percent of hogs under federal inspection since 1997. The United States is a net importer of live hogs, with virtually all imported live hogs coming from Canada. The United States has recently become a net exporter of pork.

5.1.3 Issues and Trends in the Lamb and Lamb Meat Industries

The lamb industry is small and fragmented. Although wool, lamb, and mutton are all products of the sheep industry, historically only wool has been the primary product of interest. In recent decades, production has shifted from wool to lamb as demand for wool has declined. In the past, several government programs have supported prices and incomes of sheep producers. The 2002 Farm Bill reintroduced support for wool production. Animal health issues related to scrapie and other TSE diseases are of concern to the industry. Seasonal variation

occurs in prices because of seasonal availability of and seasonal demand for slaughter lambs. Declining sheep inventories and increasing use of alternative marketing practices mean auction markets are more thinly traded.

The primary stages of lamb production are production, backgrounding, feeding, packing, and breaking. Feeder lambs are placed in feedlots where they are fed a grain-based diet to slaughter weight. Fed lambs are slaughtered by packers, and the pelts and offal are separated from the fresh meat. Packers either sell carcasses directly to breakers or sell fabricated cuts; increasingly, like other meat species, more of the breaking and boxing of cuts is being performed by packers.

Sheep production is widely distributed across the United States, but flock sizes vary significantly by geographic location. The number of producers and sheep inventories has declined steadily for over a hundred years with only about 7 million sheep now produced. As with sheep production, lamb packers are widely dispersed throughout the United States. Plants tend to be quite small except for one very large plant in northern Colorado. However, the lamb packing industry is highly concentrated. The decline in U.S. lamb production has been partially offset by increased imports of lamb from Australia and New Zealand, the two major suppliers of imports to the United States, which makes up about half of U.S. lamb consumption.

5.1.4 Issues and Trends in the Downstream Meat Industries—Wholesalers, Exporters, Food Service Operators, and Retailers

Over time, the pattern of meat consumption has been affected by changes in relative meat prices, consumer income, and tastes and preferences for meat and poultry. Total per capita meat consumption (including poultry) increased 28 percent over the past three decades with almost all the increase coming from poultry at the expense of beef. Per capita pork consumption has remained relatively constant over this time period. Comparing quarterly per capita consumption levels with real retail prices for beef and pork reveals that an inverse relationship between prices and consumption levels, which we would expect to see, has weakened over the period from 1964 to 2004. This suggests that changes in demand due to non-price factors, including those related to demand for food

consumed at home versus away from home, have increasingly become important for both beef and pork.

In 2003, consumers spent \$904 billion on food, of which \$497 was spent on food at home and \$407 billion was spent on food away from home. Concentration in food services has increased with the top 50 U.S. restaurant franchisers accounting for 39 percent of separate eating place sales in 2000. Increased competition in the retail sector from nontraditional retailers has led to increased concentration in this sector in which the top four food retailers account for 31.9 percent of U.S. retail food sales in 2001. Mergers among large retailers result from the strategy to seek additional growth opportunities and lower procurement and operation costs.

Retailers are attempting to bolster meat sales by tailoring sales to consumers who are time starved, nutritious conscious, quality conscious, and environmentally conscious. Retailers' strategies have led to increased segmentation of product offerings in the meat case; retailers now differentiate products focusing on health, convenience, taste, and information on how the food was produced.

5.2 LITERATURE RELATED TO SPOT AND ALTERNATIVE MARKETING ARRANGEMENTS

5.2.1 Theoretical Literature Relevant to Use of Alternative Marketing Arrangements

The main theories of the firm relevant to studying boundaries of the firm and incidence of vertical integration are transactions costs or rent-seeking, property rights (incomplete contracts) theory, incentives systems (agency) theory, and adaptation theory. Theory predicts that the advantages of open market procurement over alternative marketing arrangements are greater with (a) the use of standardized inputs and with many competing suppliers, (b) existence of economies of scale in the supply firms that are too large to be duplicated by the buyer, (c) existence of economies of scope, and (d) absence of specific investments on the part of either the buyer or the seller. When these conditions fail, vertical integration can occur because of the advantages of planning, protection of assets from hold-up, and capturing of monopoly inefficiencies.

Vertical integration/coordination may or may not increase market power. Increased market power is a detriment to consumers and input suppliers if competition is reduced and entry barriers are increased. Increased cost efficiencies, reduced uncertainty, and improved product quality may offset negative effects of increased market power.

Trade-offs exist between use of markets and vertical integration/coordination because markets tend to be better at minimizing production costs, and vertical coordination methods are better for minimizing transactions costs. Because of these trade-offs, a variety of hybrid forms of organization exist.

For most businesses, firm boundaries depend on interrelated choices spanning functional activities rather than independent vertical integration decisions. A general theory of the firm that allows for these interrelated choices and ways to assess what structure of the firm is best is available for use in empirical analysis. Theory has applicability to potentially interdependent choices of packers about whether to use spot markets, production contracts, marketing contracts, or some combination of these methods.

Vertical integration (owning assets in adjacent vertical sectors) and vertical coordination are the two main devices used by firms to lower costs of production and to improve coordination of production with processing and marketing of products. Agricultural producers integrating backward into input supply markets and forward into food-processing industries provide for stable input supply or access to output markets; such integration also enables firms to maintain consistent price signals with quality.

Vertical coordination is accomplished by using contracts or alliances rather than ownership of assets within successive stages of production and/or distribution. Vertical coordination is more likely to occur in industries characterized by high transactions frequency and strong market information systems. Three basic types of coordination exist: open market transactions, production and marketing contracts, and ownership of adjacent assets through cooperatives or investor-owned firms.

5.2.2 Empirical Literature on Marketing Arrangements in the Fed Cattle and Beef Industries

Because of increased concentration of the U.S. beef packing industry, empirical research has focused on the effects of “captive supply” methods on market prices of cattle. Three types of captive supplies in beef industry are packer-owned cattle fed in packer-owned and commercial feed lots, fed cattle purchased by fixed price and basis forward contracts, and exclusive contracting and purchasing agreements for securing cattle.

Most empirical work suggests an inverse relationship between captive supplies and cash market prices—the larger the share of captive supplies the lower the cash market price. Causes of the inverse relationship between captive supplies and cash-market prices are unclear because removing cattle from cash markets affects both demand and supply in cash markets, so the observed effects could be due solely to market forces and not enhanced market power. Empirical studies with aggregate data, data by individual states, and data for different time periods all indicate predominately an inverse relationship between captive supplies and cash-market prices, but the relationship was often statistically insignificant and the magnitude of the effect very small.

Empirical literature describes reasons why marketing and procurement methods for fed cattle are changing. Forward contracts can benefit both producers (including cattle feeders) and meat packers. Producers can benefit through reducing price risk, obtaining favorable financing, ensuring a buyer for cattle, and reducing marketing costs. For meat packers, forward contracts secure slaughter needs, secure quality cattle, reduce procurement costs, and reduce price risk. Marketing arrangements benefit producers through providing premiums for specified cattle quality characteristics, obtaining carcass information, ensuring a buyer for cattle, and reducing marketing costs. Meat packers use marketing arrangements to increase cattle quality control, secure slaughter needs, and reduce procurement costs. Packer-owned feeding operations also can benefit both producers and meat packers. Producers can increase feedlot utilization and improve packer-to-feedlot relationships. Meat packers are able to secure slaughter needs and increase cattle and beef quality control. Overall, the existing empirical literature suggests that captive supplies can

improve efficiency in the overall beef supply chain by improving price signals, reducing risk, and improving production and procurement efficiencies.

The decline in beef demand over the past two decades has also been a driving force for adopting marketing arrangements other than traditional market system. The decline in beef demand is due to many factors, including poor and inconsistent beef quality, changing consumer demographics and preferences, health and nutrition concerns, and lack of innovative product development. Branded beef programs are emerging as a response to changing consumer demand. The U.S. grading system does not identify adequate measures of eating quality. Branded products necessitate a new relationship with suppliers to provide a product with attributes that cannot be easily identified along the supply chain. However, consumers must be willing to pay a premium for branded products to succeed. Methods of vertical coordination used include brand licensing programs, marketing alliances, and new-generation cooperatives.

5.2.3 Empirical Literature on Marketing Arrangements in the Hog and Pork Industries

The types of marketing arrangements used in the hog and pork industries include cash or spot markets (commodity bought and sold in exchange for cash and delivered immediately to the buyer) and alternative marketing arrangements (commodity that is bought and sold in an arrangement that is neither a strictly negotiated transaction nor is made available for immediate delivery). The spot (or negotiated) price could be determined by direct trade, auction barns, video (electronic auctions), or dealers or brokers. Alternative marketing arrangements for hogs include production contracts, marketing contracts, forward contracts, marketing agreements, and internal transfers.

Increased use of alternative marketing arrangements over time has been attributed to new technology, size economies, and the need to deliver pork products to consumers with consistent quality at competitive prices. As the number of hogs under alternative marketing arrangements increases, industry observers are concerned that the open market will have less effect on price discovery and that price volatility could increase.

The declining volume of hogs marketed via cash markets does not mean cash markets are not important because cash markets still figure prominently in pricing hogs since formula-based pricing systems frequently use these prices as base prices in formula pricing. Although captive supplies could be as much as 89 percent of all hog sales, some 50 percent of hog prices are determined by spot prices as a result of the use of spot prices in formula pricing arrangements.

Concentration in the hog industry has increased with the number of hog farms falling by 50 percent between 1995 and 1999, and the number of head per operation doubling from 1998 to 2004. The financial crisis due to low hog prices in 1998 and 1999 coincided with significant consolidation and increased use of contracts. As producers get larger, they tend to rely less on cash market sales.

Two basic types of hog marketing arrangements are production contracts and marketing contracts. Under production contracts, the contractor retains ownership but supplies the hogs to a producer who furnishes housing facilities and raises hogs according to the husbandry practices specified by the contractor. Under marketing contracts, ownership of hogs is retained by the producer and the terms of future sale are specified in the contract. Marketing contracts typically specify the quality and quantity of hogs to be delivered, number of hogs to be delivered, and the price or price formula. Two types of marketing contracts are market access contracts, which only secure producers' access to markets, and risk share contracts, in which some of the price risk is shifted from producers to packers.

Carcass-merit pricing systems have transformed the hog industry. The liveweight pricing system does not explicitly provide premiums or discounts for desirable or undesirable carcass traits. Thus, the proportion of hogs marketed using carcass merit increased from 8 percent in 1980 to 75 percent in 1999. Larger operations sell virtually all their hogs on carcass-merit systems. The shift toward merit pricing is driven by increased importance of the quality of hogs marketed downstream.

Hog farmers use alternative marketing arrangements because of the desire for market access, income stability (due to reduced price volatility), improved efficiency, market security,

access to capital, and reduced marketing management. Packers' rationale for using alternative marketing arrangements includes input supply assurance and control, improved response to consumer demand, expanded and diversified operations, and risk sharing. The two primary disadvantages of contracts are loss of independence and inequitable risk and return sharing. For packers, the risk associated with securing a steady supply of high-quality hogs is most important. For producers, risk associated with obtaining capital, market access, and avoiding downturns in market are most important. Favorable opinions and merits of marketing contracts are scale neutral; however, unfavorable opinions are not scale neutral with smaller producers having stronger opinions.

5.2.4 Empirical Literature on Marketing Arrangements in the Lamb and Lamb Meat Industries

Three selling options are available to lamb producers: selling feeder lambs to feedlots, retail ownership of lambs through contract feeding, and selling fed lambs directly to packers. Available marketing methods for selling feeder and slaughter lambs include direct sales by lamb producer to feedlots or packers, sales through buyers and dealers for feedlots and packers, sales at terminal markets, traditional and special auction sales, electronic and video sales, and direct marketing to consumers.

In the 1980s, the most common method of selling feeder lambs was direct negotiation between producers and feeders, and the most common method of selling fed lambs was direct sales under contract with packers. In recent years, an increasing proportion of sheep and lambs have been sold through nonpublic markets. Also, the number of producer-owned cooperatives for lamb production and marketing has increased; however, the success of these appears to depend on the use of contracts.

5.3 INTERIM STUDY RESULTS

The key dimensions that define a marketing arrangement include the procurement or sales method, ownership method of the animal or product, pricing method (including formula pricing base and internal transfer pricing method), and valuation method for livestock. Many terms define each type of marketing arrangement including whether the arrangement is

oral or written, who arranges and pays for transportation, how far in advance negotiations occur, duration, quantity and quality requirements, and other terms. Across all types of marketing arrangements, the main reasons why buyers and sellers of livestock and meat might use particular types of marketing arrangements include the following: provides ability to purchase at lower prices or sell at higher prices, reduces risk exposure, reduces cost of activities for buying and selling, reduces price volatility, reduces potential liability and litigation concerns, increases supply chain information, ensures higher-quality livestock or meat, and facilitates or increases market access. Market participants that use only the cash market might do so for reasons in addition to these. Many market participants also use a combination of the cash market and alternative marketing arrangements.

5.3.1 Fed Cattle Producers, Feeders, and Packers

Key interim study findings for the fed cattle and beef industries include the following:

- Industry procurement and sales practices vary significantly across the cow-calf, backgrounding, feeding, slaughter and processing, and downstream marketing levels as follows:
 - Forward contracting appears to be the most common alternative marketing arrangement at the cow-calf and backgrounding levels, but there are also some production contract-like arrangements at the backgrounding level.
 - Marketing agreements appear to be the most common alternative marketing arrangement at the feeding stage; these marketing agreements are priced largely using formula pricing.
 - Forward contracting with formula pricing appear to be the most common type of alternative marketing arrangement between packers and downstream buyers.
- Industry procurement and sales practices can be characterized as portfolios of various arrangements including spot markets, marketing agreements, forward contracts, and custom feeding. The reasons for diversified procurement and sales portfolios include supply management, timing and scheduling maintenance, transaction cost reductions, operations

cost reductions, quality assurances, risk management, and maintenance of trading flexibility.

- Market participants are shifting away from cash or spot market participation towards more mechanical types of marketing arrangements with unknown effects on markets for producers, packers, and consumers. The individual incentives are clear in that alternative arrangements reduce costs but market implications are less well known.
- Individual marketing arrangement choices seem to be interdependent with production decisions in the sense that different marketing methods provide incentives for changing production systems.
- Marketing agreements exhibit considerable variation in details but appear to have consistent structures. The most common agreements use formula prices based on a reported liveweight price, a reported boxed beef price, or internal boxed beef prices and also include adjustments for premiums and discounts for meat quality and consistency.
- Alternative arrangements also appear to encompass various elements of price risk management.

5.3.2 Pork Producers and Packers

Key interim study findings for the hog and pork industries include the following:

- Industry procurement practices can be best characterized as portfolios of various arrangements including spot markets, production contracts, marketing contracts, and production of livestock on company-owned farms. The reasons for diversified procurement and marketing portfolios include price and market access risk management, quantity and quality assurances, and maintenance of market flexibility.
- There seems to be a general tendency away from cash or spot market participation towards more advanced types of marketing arrangements with yet unclear effects on producers, packers, and consumers.
- Individual marketing arrangement choices seem to be interdependent with other marketing decisions in the sense that different methods seem to exhibit significant complementarities. In other words, a decision to increase the level of one activity raises the profitability of any increases in the levels of other complementary activities. Therefore, high use of marketing contracts

may go together with the high use of production contracts.

- Production contracts exhibit a high degree of uniformity when it comes to division of responsibilities for providing production inputs and a fair amount of diversity when it comes to the specification of grower payment mechanisms. The packer (principal) always owns animals and feed, and the grower (agent) always provides housing facilities and labor. The remuneration schemes vary from high-powered incentives (e.g., variable piece rates with bonuses and penalties) to extremely low-powered schemes (e.g., fixed payments per square foot of the housing facilities).
- Marketing contracts exhibit great variation in terms of pricing methods, valuation methods, and other specific contract provisions. The most frequently observed variety type of marketing contract is one in which compensation is based on the Iowa-Minnesota live hog price or a carcass price with premiums or discounts based on a carcass pricing grid and with standards for minimum live or carcass weight, minimum quality requirements, and some element of price risk management.
- More recent developments in marketing contract design seem to indicate a very gradual but consistent shift toward requirements for more uniform production practices with a declining emphasis on individual carcass merit. The main reason for this shift is mainly caused by difficulties associated with measuring PSE indicators.

5.3.3 Lamb Producers, Packers, and Breakers

Key interim study findings for the lamb and lamb meat industries include the following:

- Quantities of lamb consumed in the United States are small and markets tend to be geographically dispersed.
- Because of current excess lamb slaughter capacity, lamb packers cannot always obtain the quality of lambs they desire.
- Lamb products are often produced to meet specific needs of specialty markets.
- Many producer-owned cooperatives slaughter and process lambs.
- A high volume of lambs are slaughtered on a custom basis without the packer taking ownership of the lambs.

- A high proportion of lamb carcasses are shipped (sometimes long distances) for processing in breaker plants.
- Most transactions are either cash market transactions or relatively informal types of marketing arrangements.

5.3.4 Downstream Meat Industries

Key interim study findings for the downstream meat industries include the following:

- Most meat buyers use written contracts and purchase meat from multiple packers. They tend to use a combination of contracts and spot or cash market transactions.
- A primary driver for the use of alternative marketing arrangements for the downstream meat industries is the development of strong supply chain relationships that are based on loyalty and consistency over the long-term.
- The downstream meat industries use alternative marketing arrangements to manage market volatility because they provide a predictable, steady stream of meat products and deliveries. Stable, predictable prices and volumes are essential to customer satisfaction and loyalty for the downstream industries to maintain the consistency and quality of menu items and/or meat case inventories.
- Industry participants noted that many of the recent procurement method changes were due to changes in customer preferences.
- Specific reasons mentioned by individual downstream participants for using particular types of marketing arrangements: forward contracts are used to control costs and manage volatility, quantity requirements are included based on quarterly projections, and quality considerations are extremely important.
- Formula pricing is used because of requirements for volume, quality, and timing. Formula pricing is easy to manage, and buyers know they are paying market price less volume discounts plus the cost of additional services.

5.4 INTERIM STUDY CONCLUSIONS

- **The livestock industry from farm to retailers is complex and generally involves using a portfolio of marketing arrangements: cash (spot) markets,**

marketing contracts, production contracts, and vertical integration. Supply chain management, risk management, market access, and reduced transactions costs are key factors in choosing alternative marketing arrangements.

- **Overall, there is congruence between economic theory, past empirical work, and discussions with industry participants on the reasons for selecting marketing arrangements.** Empirical research and industry discussions enable identification of the key marketing arrangements and provide insight into the factors influencing choices by participants. Choice of marketing arrangement is driven in large part by changing consumer demand for meat products.
- **Industry structure and trends have strongly influenced the portfolio of marketing arrangements in the cattle and beef industries.** Because of land requirements for cow-calf operations and genetic diversity, cash (spot) market and marketing contracts are the primary types of marketing arrangements at the producer and feeder levels. Increased concentration and consolidation in both feeding and beef packing has led to more forward contracting to improve supply chain management. At the same time, an increase in the proportion of control of marketing prior to sale and slaughter has resulted in thinner cash markets and concern about possible market power of feeders and packers. Increased demand by consumers for higher and consistent quality of beef is the driving force toward use of alternative marketing arrangements.
- **A general trend is movement away from cash or spot markets toward alternative marketing arrangements in the hog and pork industries with unclear effects on producers, packers, and consumers.** Quantity and quality assurances, risk management, and market flexibility are the reasons for using a portfolio of arrangements, including spot markets, production contracts, marketing contracts, and livestock production on company-owned farms. The thinness of spot market transactions is a major concern in the pork industry, although the predominant use of spot markets in marketing and production contracts suggests spot markets are very important for price discovery. Present trends in the industry toward marketing contract design and more uniform production practices mean that carcass merit pricing is becoming somewhat less important for hog pricing.

- **The lamb industry continues to use primarily cash or spot markets with little use of alternative marketing arrangements, except for producer-owned cooperatives.** The wide dispersion of production with many specialty markets for lamb continues to characterize this industry.
- **Increased concentration and increased coordination with meat packers characterize the downstream meat industries.** Consumer demand trends toward convenience, one-time shopping, and health are the driving forces behind continued changes for retailers, food service, and exporters. Increased use of alternative marketing arrangements occurs because of the desire to provide a steady supply of consistent quality meat products.
- **Use of alternative marketing arrangements provides clear benefits to producers, packers, processors, and consumers that need to be weighed against the possible disadvantages.** In particular, the advantages of alternative marketing arrangements need to be weighed against creation of thin spot markets and increased market power. The magnitude and distribution of net benefits of alternative marketing arrangements across producers, packers, processors, and consumers need to be quantified.

6

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Appendix A: Glossary of Terms

This appendix provides a glossary of terms developed for use in the study. In some cases, definitions for these terms are readily available in the literature; in other cases, working definitions were developed based on information collected during the study and discussions conducted with industry participants.

Table A-1. Glossary of Terms

Term	Stage of Production^a	Definition
Alliances	All	Relationship formed by two or more industry participants to meet common production or marketing objectives and to improve information flow.
Alternative procurement methods	All	Procurement or marketing contracts, production contracts, packer-owned arrangements, forward contracts, marketing agreements, or other alternatives to the cash or spot market.
Alternative sales methods	All	Forward contracts, marketing agreements, (packer fed/owned arrangements), and other alternatives to the cash or spot market.
Backgrounding	Producer	The process of keeping ruminant animals on pasture or range for grazing prior to moving them into a feedlot.
Barrow	Producer	A male pig castrated before it reaches sexual maturity.
Benchmarking	All	Comparing the base price used in the formula to some market or reported price or comparing the current pricing arrangement to bids from other companies that entities buy from.
Boxed meat	All	Meat that has been cut into primals or subprimals, vacuum packed, and placed into boxes (e.g., boxed beef).
Branded	Packer, Processor, Downstream	Product sold with a national, regional, or store brand name.
Breaker	Processor	Meat processors that specialize in breaking down carcasses but do not slaughter (most common in the lamb industry).
Bundling	Packer, Processor, Downstream	Buyer must purchase other related products to receive a lower price.
By-products	Packer, Processor, Downstream	Hides (pelts), offals, bones, grease, and all other beef, lamb, or pork products <i>not</i> included in fresh, frozen, or processed meat.
Carcass	All	The dressed or slaughtered animal consisting of the skeleton with its attendant muscle and fat.
Carcass merit pricing	Producer, Packer	Prices are adjusted by premiums or discounts based on characteristics of the carcass, such as lean percentage, weight, backfat thickness, and loin eye depth (also known as grid pricing).
Carcass weight	Producer, Packer, Processor	Dressed or rail weight.
Case ready	Packer, Processor, Downstream	Meats packaged in a centralized facility and shipped to supermarkets for display in refrigerated cases.
Cash or spot market	Packer	Purchasing (selling) product directly from (to) a seller (buyer) less than 3 weeks forward at list or negotiated price, including any specified discounts or premiums.
Cash or spot market	Producer	Purchasing (selling) livestock through direct trade, auctions, or dealers within 2 weeks of delivery or kill date.
CBOT	Producer, Packer	Chicago Board of Trade: a company that facilitates the trade of futures market contracts, particularly crop commodities.
Certification programs	All	Programs that certify livestock breed, carcass characteristics, product characteristics (e.g., Kosher), or product-processing method.

(continued)

Table A-1. Glossary of Terms (continued)

Term	Stage of Production^a	Definition
CME	Producer, Packer	Chicago Mercantile Exchange: a company that facilitates the trade of futures market contracts, particularly livestock commodities.
Combo	Packer, Processor, Downstream	Large bins constructed of cardboard and plastic used to carry bulk meat products.
Cooperative	Producer, Packer	A formal group of individual producers that joins together for collective purchasing, marketing, or other related activities.
Cow	Producer, Packer	Female bovine that has given birth to at least one calf.
Cow-calf operations	Producer	Operations that specialize in maintaining a cattle breeding herd for the production of beef calves.
Custom processing or copacking	All	Processing of meat products by a manufacturer other than the company whose name appears on the product label. Examples include outside contracting and private labeling.
Custom slaughter	Producer, Packer	Providing slaughter services for a fee (also known as toll kill).
Direct trade	All	Cash- or spot-market transaction between an individual buyer and seller of livestock within 2 weeks of delivery or kill date, or between an individual buyer and seller of meat within 3 weeks of delivery.
Dressed weight	Producer, Packer	Weight of an animal carcass (also known as carcass weight or rail weight).
Dressing percentage	Producer, Packer	Percentage of an animal's liveweight that results in dressed weight; calculated as dressed weight divided by liveweight (also known as yield percentage).
Evergreen	All	Agreement or contract that continues indefinitely until either party decides to terminate.
Ewe	Producer, Packer	Mature female sheep.
Ewe-lamb producer	Producer	Producers who maintain a sheep-breeding herd for the production of lambs.
Exclusive dealings	Downstream	Requirement in which a buyer is prohibited from buying and reselling the same products from another supplier.
Fabrication	Packer, Processor	Fashioning one or more pieces of meat into an end or intermediate meat product.
Farrow-to-wean operations	Producer	Operations that specialize in maintaining a swine-breeding herd for the production of weaner pigs.
Fat-o-Meat'er	Packer	A type of optical probe used in the pork industry to estimate the lean percentage of a carcass.
Fed livestock	Producer, Packer	Livestock raised specifically for the production of fresh meat products that are ready for slaughter (also known as finished, slaughter, or market animals), such as finished cattle, slaughter lambs, market hogs.
Feeder livestock	Producer	Livestock raised specifically for the production of fresh meat products that are ready to enter the final stage of production (also known as stockers)
Feeders	Producer	Individuals that operate feedlots.
Feeder-to-finish operations	Producer	Swine operations that specialize in raising pigs from feeder pigs to finished hogs.

(continued)

Table A-1. Glossary of Terms (continued)

Term	Stage of Production^a	Definition
Feedlot	Producer	A location where cattle and sheep are fed a high-energy ration in preparation for slaughter (also known as feedyards).
Finished livestock	Producer, Packer	See fed livestock.
Finishing operation	Producer	A location where hogs are fed a high-energy ration in preparation for slaughter.
Flat pricing	Downstream	Buyer and seller agree to a specific dollar per pound for a specified period.
Floor and ceiling pricing	Downstream	Agreed-on purchase price increases and decreases with market prices but has a lower limit and an upper limit for a specified period.
Food service establishment	All	Restaurants, hotels, institutions, or other food service establishments located in the United States.
Foreign buyers	All	Foreign distributors, retailers, or food service establishments.
Formula pricing	All	Mean using another price as the base for the purchase (sale) of livestock (e.g., USDA price). The formula can include grid or nongrid values.
Forward contract	Producer, Packer	Oral or written agreement between a buyer (packer) and seller for the <i>future</i> purchase of a specified quantity of livestock. Contract is entered into at any time between placement of livestock on feed and 2 weeks prior to kill date or delivery.
Forward contract	Downstream	Oral or written agreement between a buyer and seller for the <i>future</i> purchase of a specified quantity of livestock (product) at either a fixed or base price.
Further processing	Packer, Processor	Activities beyond fabrication of primals, subprimals, and cuts (e.g., grinding, cooking, and heat treating).
Futures contract	Producer, Packer	An agreement to buy or sell a commodity at a future date in accordance with contract terms.
Futures markets	Producer, Packer	Exchange where futures contracts are traded under formal and regulated conditions.
Futures price	Producer, Packer	Commodity prices determined in a futures market.
Gilt	Producer	Female swine that has not given birth to a litter of pigs. ^b
Grid	Producer, Packer	The actual price grid (matrix) used to establish premiums and discounts in carcass-merit pricing.
Grid pricing	All	Prices are adjusted by premiums or discounts for specific carcass-quality characteristics, such as grade and yield.
Ground, including trimmings	Packer, Processor, Downstream	Raw meat that has been ground but has not received any additional processing, including case-ready ground product.
Grower	Producer	Individual who raises animals (typically used in reference to a hog grower).
Heifer	Producer, Packer	Young female bovine that has not had a calf. ^c
Hot weight	Producer, Packer	Weight of a carcass before it has been chilled (also known as carcass or rail weight).

(continued)

Table A-1. Glossary of Terms (continued)

Term	Stage of Production^a	Definition
Individually negotiated pricing	All	Negotiations between a buyer and seller, <i>excluding</i> negotiated formula pricing.
Internal transfer	Producer	Transfer of livestock to (from) another business unit owned by the same company (not including packer fed/owned).
Internal transfer	Packer (procurement)	Transfer of packer-owned livestock from a feedlot to the slaughter plant.
Internal company transfer	Packer (sales), Processor, Downstream	Transfer of product to (from) another business unit owned by the same company.
Isowean pigs	Producer	Pigs that have been weaned from a sow early and placed into a nursery
Joint venture	All	Two or more businesses joining together under a contractual agreement for a <i>specific</i> venture, with all parties sharing profits and losses.
Marketing agreement	All	<i>Long-term</i> oral or written agreement between a buyer and seller where a buyer agrees to purchase product under specific terms (including preferred vendor programs).
Marketing contract	Producer, Packer	See procurement contract.
Matrix	Producer, Packer	See grid.
Meat	All	Edible part of muscle from cattle, sheep, or swine-dressed carcasses (excludes offal and by-products).
Mutton	All	Meat from mature sheep.
National or regional brand	All	Brand that is sold by various retailers throughout the country or in a specific region.
No roll	Packer	Carcasses that were not federally graded because of low quality.
Nurseries	Producer	Swine operations that specialize in raising pigs from isoweans to feeder pigs.
Offal	Packer	Viscera removed at slaughter.
Or-better pricing	Packer, Processor, Downstream	Buyer and seller agree to a specific dollar per pound for a specified period; however, if the market price decreases over that period, then the purchase price decreases as well.
Outs and culls	Producer, Packer	Atypical livestock that have been sorted out because of poor quality.
Packer fed/owned	Producer	Livestock are owned by the packer and fed for slaughter at either a custom feedlot or a packer-owned or controlled feedlot.
Packer fed/owned	Packer	Transfer of livestock from a packer or subsidiary where livestock were fed for slaughter at either a custom feedlot or a packer-owned or controlled feedlot more than 2 weeks prior to kill date.
Partner arrangement	Producer	Arrangement between two parties at the same level of production for the purchase of livestock.
Pay weight	Producer, Packer	Weight used to calculate payment (e.g., liveweight minus shrink).

(continued)

Table A-1. Glossary of Terms (continued)

Term	Stage of Production^a	Definition
Pelt	Packer	Hide with wool removed from sheep at slaughter.
Portion cuts	Packer, Processor, Downstream	Steaks, chops, and other cuts of meat that have been cut to uniform sizes or weights and packaged in bulk.
Price list	All	A specified schedule of prices used for the sale of meat products.
Primal cuts	All	Groups of muscles from the same area of the carcass; also referred to as wholesale cuts (e.g., beef loin, beef chuck).
Private label brand	All	Product brand that is sold exclusively by one retailer.
Processed meats	Packer, Processor, Downstream	Meat products that were produced from carcass meats by drying, curing, smoking, cooking, or other similar practices (e.g., cold cuts, sausages, ham, bacon).
Processed, not ready to eat	All	Meat products that have received further processing and require cooking to achieve food safety (e.g., partially cooked meat patties).
Processed, ready to eat	All	Meat products that have received further processing and do <i>not</i> require cooking to achieve food safety (e.g., lunch meats, cooked sausages, and precooked meat).
Processing	Packer, Processor, Downstream	Manufacturing meat products from carcass meats by drying, curing, smoking, cooking, or other similar practices.
Procurement or marketing contract	Producer, Packer	Formal agreement specifying the terms for the (<i>future</i>) transfer of livestock between a seller and buyer using a prespecified price or payment formula.
Production contract	Producer, Packer	Formal agreement between a packer or integrator and grower for the production and delivery of pigs or hogs (market hogs) where the ownership of the animals (hogs) is retained by the packer or integrator and the grower is compensated for housing and husbandry.
PSE	Producer, Packer	Pale, Soft, Exudative: a condition, most frequently found in pork, in which meat is very light in color, has a soft texture, and a high degree of drip loss.
Quality grade	Producer, Packer	Assessment of meat palatability determined by a USDA inspector who evaluates the carcass. The most common beef quality grades are Prime, Choice, and Select. Choice is the most common lamb quality grade. Pork grades are numbered 1 through 4 but are seldom used.
Retail cuts	Packer, Processor, Downstream	Steaks, roasts, chops, ground meat, and other products sold from refrigerated cases by retail food stores and specialty meat shops.
Retail establishments	All	Grocery stores, meat markets, warehouse clubs, mass merchandisers, or other retail establishments located in the United States.
Sales method	All	Transfer of product from one plant's physical location to another physical location, including internal product transfers to another business unit owned by the same company.
Sealed bid	All	Price is determined by a sealed bidding process between multiple buyers and sellers.
Shackle space	Producer, Packer	Refers to the hooks used to hang carcasses on the slaughter line; the space occupied by a carcass in a slaughter plant

(continued)

Table A-1. Glossary of Terms (continued)

Term	Stage of Production^a	Definition
Shared ownership	All	A vertical arrangement in which two businesses from different industry segments both retain partial ownership of livestock or meat products.
Shrink	Producer, Packer	Loss in weight of live animals during transport or moisture loss in meat products.
Slide	Producer	A specified formula used to adjust prices based on an animal's weight relative to a target weight.
Sow	Producer	Female swine that has given birth to at least one litter of pigs.
Steer	Producer, Packer	Male bovine castrated within the first six months from birth.
Subprimal cuts		Smaller cuts of meat taken from primal cuts, but from which even smaller cuts can be made (e.g., beef sirloin, beef chuck arm half).
Swine integrator	Producer, Packer	Business that contracts with producers or other businesses to perform specific steps in the swine production process, such as breeding and birthing, nursery care, growing and finishing, transportation, processing, and marketing.
Trimming	Packer, Processor	Small portions of meat and fat removed from larger meat cuts.
Two-part pricing	Downstream	Pricing that includes a fixed payment (e.g., slotting allowance) and a per-unit price.
USDA Process Verified	All	Suppliers are able to make marketing claims—such as breed, feeding practices, or other raising and processing claims—and market themselves as “USDA Process Verified.”
Volume discounts	Downstream	Pricing in which larger shipments have lower per-unit prices.
Weaned pigs	Producer	Pigs that have been removed (weaned) from the sow.
Weaner-to-feeder operations	Producer	Swine operations that specialize in raising pigs from weaned pigs to feeder pigs.
Yield grade	Producer, Packer	Assessment of a carcasses cutability determined by a USDA inspector who evaluates the carcass. Yield grades are numbered 1 through 5, with 1 providing the most edible percentage and 5 the least.
Yield percentage	Producer, Packer	See dressing percentage.

^aDownstream includes wholesalers, exporters, food service establishments, and retailers.

^bIn some cases, “gilt” may include young female swine that have had one litter.

^cIn some cases, “heifer” may include young female bovine that have had one calf.

Source: Some of the definitions were derived from: Urner Barry's Yellow Sheet. A Glossary of Meat Industry Terms. Bayville, NJ: Urner Barry Publications, 2004.

Appendix B: Industry Interview Materials

This section includes the materials used to conduct discussions with industry participants regarding the use of alternative marketing arrangements. These materials included a one-page project description given to industry participants prior to the interviews, lists of topics used for discussions with trade associations, and discussion guides used for in-depth discussions with industry participants. We used different lists of topics and discussion guides for producers, packers/processors, and downstream industry participants.

<p style="text-align: center;">LIVESTOCK AND MEAT MARKETING STUDY PROJECT DESCRIPTION</p>

USDA's Grain Inspection, Packers and Stockyards Administration (GIPSA) contracted with RTI International (RTI) and a team of university-based researchers to conduct a congressionally funded study of marketing practices in the entire livestock and meat industries. The study will address many of the questions and concerns that have been raised about changes in the structure and marketing practices of the livestock and meat industries. More information about the study can be found at www.usda.gov/gipsa by following the "Marketing Study" link.

As part of the analysis, we are collecting information through discussions with industry participants from all facets of the livestock and meat industry, including the farm-to-retail sectors for beef, pork, and lamb. We will use the information from these discussions to learn more about the ways in which livestock and meat products are purchased and sold throughout the supply chain. We are also interested in understanding the effects of buying and selling methods on costs and efficiencies, product quality, risk shifting, and other aspects of livestock and meat marketing.

We are requesting your participation in an individual discussion for this project. In conducting the discussion, we will use a discussion guide that contains questions related to the following:

- methods of buying and selling livestock and meat,
- terms and pricing used for buying and selling livestock and meat,
- reasons for using particular buying and selling methods, and
- effects of particular buying and selling methods.

RTI is an independent, not-for-profit research organization located in Research Triangle Park, North Carolina. All information collected during the interviews will be used for research purposes only and will be subject to the confidentiality provisions of the Confidential Information and Protection and Statistical Efficiency Act of 2002 (CIPSEA) and Packers and Stockyards Act. Your responses will be summarized with other responses in our report to GIPSA. Please note that, in addition to participating in these discussions, you may also receive a questionnaire in summer 2005 for a survey developed to provide numerical estimates related to each of the above issues.

For more information about the study or the interviews, please contact:

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RTI International
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Research Triangle Park, NC 27709-2194
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Livestock and Meat Marketing Study

December 2004

<p>LIVESTOCK AND MEAT MARKETING STUDY</p> <p>PROJECT DESCRIPTION</p>
--

USDA's Grain Inspection, Packers and Stockyards Administration (GIPSA) contracted with RTI International (RTI) and a team of university-based researchers to conduct a congressionally funded study of marketing practices in the entire livestock and meat industries. The study will address many of the questions and concerns that have been raised about changes in the structure and marketing practices of the livestock and meat industries. More information about the study can be found at www.usda.gov/gipsa by following the "Marketing Study" link.

As part of the analysis, we are collecting information through discussions with industry participants from all facets of the livestock and meat industry, including the farm-to-retail sectors for beef, pork, and lamb. We will use the information from these discussions to learn more about the ways in which livestock and meat products are purchased and sold throughout the supply chain. We are also interested in understanding the effects of buying and selling methods on costs and efficiencies, product quality, risk shifting, and other aspects of livestock and meat marketing.

We are requesting your participation in an individual discussion for this project. In conducting the discussion, we will use a discussion guide that contains questions related to the following:

- methods of buying and selling livestock and meat,
- terms and pricing used for buying and selling livestock and meat,
- reasons for using particular buying and selling methods, and
- effects of particular buying and selling methods.

The Fed Cattle and Beef Team for the study includes individuals associated with Kansas State University, Colorado State University, the University of Pennsylvania, and Econsult. The team is working with RTI, an independent, not-for-profit research organization located in Research Triangle Park, North Carolina.

All information collected during the interviews will be used for research purposes only and will be subject to the confidentiality provisions of the Confidential Information and Protection and Statistical Efficiency Act of 2002 (CIPSEA) and Packers and Stockyards Act. Your responses will be summarized with other responses in our report to GIPSA. Please note that, in addition to participating in these discussions, you may also receive a questionnaire in summer 2005 for a survey developed to provide numerical estimates related to each of the above issues.

For more information about the study or the interviews, please contact:

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**Discussion Topics for Trade Associations—Livestock Production Segment
GIPSA Livestock and Meat Marketing Study**

The topics of discussion focus on procurement and marketing of livestock (cattle, hogs, and sheep). We are interested in general observations about the industry as a whole. Please note that all information from this discussion will be summarized with other responses in our report.

1. General types of livestock procurement and marketing methods used throughout the industry
2. Changes (and the motivations for changes) in the use of different types of procurement and marketing methods over time
3. Primary benefits of using different types of procurement and marketing methods
4. Negative effects associated with different types of procurement and marketing methods
5. Impediments to using particular types of procurement and marketing methods
6. Expectations about future use of different types of procurement and marketing methods across the industry
7. Recommendations for industry individuals to interview

For more information about the study, please contact:

Mary Muth at 919-541-7289 (muth@rti.org)
Justin Taylor at 919-541-7224 (jtaylor@rti.org)

**Discussion Topics for Trade Associations—Packer and Processor Segment
GIPSA Livestock and Meat Marketing Study**

The topics of discussion focus on procurement and marketing of livestock and/or meat (beef, pork, and lamb). We are interested in general observations about the industry as a whole. Please note that all information from this discussion will be summarized with other responses in our report.

1. General types of livestock and meat procurement and marketing methods used throughout the industry
2. Changes (and the motivations for changes) in the use of different types of procurement and marketing methods over time
3. Primary benefits of using different types of procurement and marketing methods
4. Negative effects associated with different types of procurement and marketing methods
5. Impediments to using particular types of procurement and marketing methods
6. Expectations about future use of different types of procurement and marketing methods across the industry
7. Recommendations for industry individuals to interview

For more information about the study, please contact:

Mary Muth at 919-541-7289 (muth@rti.org)
Justin Taylor at 919-541-7224 (jtaylor@rti.org)

**Discussion Topics for Trade Associations—Wholesalers, Retailers,
Food Service Operators, and Exporters
GIPSA Livestock and Meat Marketing Study**

The topics of discussion focus on buying and selling of meat (beef, pork, and lamb). We are interested in general observations about the industry as a whole. Please note that all information from this discussion will be summarized with other responses in our report.

Purchases of Meat Products

1. How do member companies buy meat products?
2. What types of companies do they buy from (for example, packers, processors, distributors/wholesalers, and brokers)?
3. What types of contracts are used?
4. Why do they use certain methods for buying meat products?
5. What changes do you see occurring in the methods for buying meat (for example, supply chain relationships, alliances, and contracting)?
6. What changes in purchasing methods are being driven by the customer base?
7. What types of requirements do buyers place on meat suppliers?

Sales of Meat Products to Other Companies

1. How do member companies sell meat products?
2. What types of companies do they sell to (for example, retailers, food service, wholesalers, exporters)?
3. What types of contracts are used?
4. Why do they use certain methods for selling meat products?
5. What changes do you see occurring in the methods for meat sales (for example, supply chain relationships, alliances, and contracting)?

Recommendations for Industry Individuals to Interview

For more information about the study, please contact:

Mary Muth at 919-541-7289 (muth@rti.org)
Justin Taylor at 919-541-7224 (jtaylor@rti.org)

**Discussion Guide—Livestock Production Segment
GIPSA Livestock and Meat Marketing Study**

In the questions below, marketing arrangements refer to methods of selling or transferring livestock through the supply chain, such as traditional spot markets, marketing contracts, internal transfers, and others. We are interested in obtaining a company-wide perspective, but please explain any significant regional differences. Please note that all information from this discussion will be summarized with other responses in our report to GIPSA.

Part 1. Company and Plant Characteristics

1. Which livestock species does your company handle?

2. What types of establishments does your company operate?

3. Which regions of the country does your company operate in?

4. What is the total employment for your company?

5. Is your company publicly owned, privately owned, a cooperative, or other (please specify)?

Part 2. Types of Procurement Methods Used

1. What types of ownership arrangements do you use for livestock that you procure?

2. How would you classify these ownership arrangements?

- ☐ Sole ownership by this operation
- ☐ Partner arrangement
- ☐ Shared ownership
- ☐ Joint venture
- ☐ Delivered by owner for custom feeding/backgrounding

3. What types of methods does your company use to purchase or receive livestock?

4. How would you classify these purchasing methods?

- ☐ Spot market/open market
- ☐ Auction barns
- ☐ Video/electronic auctions
- ☐ Dealers
- ☐ Direct trade
- ☐ Forward contract
- ☐ Production contract
- ☐ Marketing agreement
- ☐ Packer fed/owned
- ☐ Delivered by owner for custom feeding/backgrounding

5. What types of alliances do you participate in on the buying side?

6. Who are the participants in the alliance?

- ☐ Genetics/seed stock supplier
- ☐ Feed company
- ☐ Another production segment (specify: _____)
- ☐ Packer/processor
- ☐ Food service operators
- ☐ Retailers

Part 3. Characteristics of Procurement Methods Used

1. What are the characteristics of your most frequently used procurement method?
 - a. Is it oral or written? _____
 - b. Are there specific quantity or quality requirements? _____
 - c. What quality measures are used and when is quality determined? _____
 - d. How are prices determined? _____
 - For formula pricing, what is the base and timing of the base? _____
 - What types of premiums or discounts are applied? _____
 - e. How far in advance of delivery are the arrangements made? _____
 - f. What are the delivery arrangements (who arranges, who pays)? _____
 - g. What termination options are available? _____
 - h. How are disputes settled? _____
 - i. Other key characteristics? _____
2. What are the primary reasons your company uses this method to procure livestock?

 - If this method affects **costs**, what would you guess is the percentage change in costs compared to using the spot market? _____
 - If this method affects **quality**, what would you guess is the percentage change in value compared to using the spot market? _____
3. How do buyer requirements influence methods of livestock procurement?

4. What procurement methods would your company like to use that it is not currently using? Why aren't these methods being used currently?

5. How do you expect your company's use of procurement methods to change in the next 5 years? Are these changes due to customer preferences?

Part 4. Types of Sales Methods Used

1. What types of ownership arrangements do you use for livestock that you sell?

2. How would you classify these ownership arrangements?

- ☐ Sole ownership by this operation
- ☐ Partner arrangement
- ☐ Shared ownership
- ☐ Joint venture
- ☐ Delivered by owner for custom feeding/backgrounding

3. What types of methods does your company use to sell or transfer livestock?

4. How would you classify these sales methods?

- ☐ Spot market/open market
- ☐ Auction barns
- ☐ Video/electronic auctions
- ☐ Dealers
- ☐ Direct trade
- ☐ Forward contract
- ☐ Production contract
- ☐ Marketing agreement
- ☐ Packer fed/owned
- ☐ Delivered by owner for custom feeding/backgrounding

5. What types of alliances do you participate in on the sales side?

6. Who are the participants in the alliance?

- ☐ Genetics/seed stock supplier
- ☐ Feed company
- ☐ Another production segment (specify: _____)
- ☐ Packer/processor
- ☐ Food service operators
- ☐ Retailers

Part 5. Characteristics of Sales Methods Used

1. What are the characteristics of your most frequently used sales method?
 - a. Is it oral or written? _____
 - b. Are there specific quantity or quality requirements? _____
 - c. What quality measures are used and when is quality determined? _____
 - d. How are prices determined? _____
 - For formula pricing, what is the base and timing of the base? _____
 - What types of premiums or discounts are applied? _____
 - e. How far in advance of delivery are the arrangements made? _____
 - f. What are the delivery arrangements (who arranges, who pays)? _____
 - g. What termination options are available? _____
 - h. How are disputes settled? _____
 - i. Other key characteristics? _____
2. What are the primary reasons your company uses this method to sell livestock?

 - If this method affects **costs**, what would you guess is the percentage change in costs compared to using the spot market? _____
 - If this method affects **quality**, what would you guess is the percentage change in value compared to using the spot market? _____
3. How do buyer requirements influence methods of livestock sales?

4. What sales methods would your company like to use that it is not currently using? Why aren't these methods being used currently?

5. How do you expect your company's use of sales methods to change in the next 5 years? Are these changes due to customer preferences?

Part 6. Effect of Restrictions on Packer Ownership of Livestock

If relevant, please describe the effects that restrictions on packer ownership would have on your company.

1. **Short-Run Effects**—What kind of immediate adjustments would your company have to make if packer ownership of livestock were restricted?

2. **Long-Run Effects**—What effect would restrictions on packer ownership of livestock have on how your company operates in the long run?

Contact Information:

If you have questions about this discussion or the study, please contact Justin Taylor at 919-541-7224 or jtaylor@rti.org.

**Discussion Guide—Packer Segment
GIPSA Livestock and Meat Marketing Study**

In the questions below, marketing arrangements refer to methods of selling or transferring livestock and meat through the supply chain, such as traditional spot markets, marketing contracts, internal transfers, and others. We are interested in obtaining a company-wide perspective, but please explain any significant regional differences. Please note that all information from this discussion will be summarized with other responses in our report to GIPSA.

Part 1. Company and Plant Characteristics

1. Which livestock species does your company handle?

2. What types of establishments does your company operate?

3. Which regions of the country does your company operate in?

4. What is the capacity of each slaughter plant your company operates (on a weekly or annual basis)?

5. What is the total employment for your company?

6. Is your company publicly owned, privately owned, a cooperative, or other (please specify)?

Part 2. Types of Procurement Methods Used

1. What types of ownership arrangements do you use for livestock that you procure?

2. How would you classify these ownership arrangements?

- ☐ Sole ownership by this operation
- ☐ Partner arrangement
- ☐ Shared ownership
- ☐ Joint venture

3. What types of methods does your company use to purchase or receive livestock?

4. How would you classify these purchasing methods?

- ☐ Spot market/open market
- ☐ Auction barns
- ☐ Video/electronic auctions
- ☐ Dealers
- ☐ Direct trade
- ☐ Forward contract
- ☐ Production contract
- ☐ Marketing agreement
- ☐ Packer fed/owned

5. What types of alliances do you participate in on the buying side?

6. Who are the participants in the alliance?

- ☐ Genetics/seed stock supplier
- ☐ Feed company
- ☐ Livestock producer
- ☐ Finisher/feedlot
- ☐ Processor
- ☐ Food service
- ☐ Retailer
- ☐ Exporter
- ☐ Another segment (specify: _____)

Part 3. Characteristics of Procurement Methods Used

1. What are the characteristics of your most frequently used procurement method?
 - a. Is it oral or written? _____
 - b. Are there specific quantity or quality requirements? _____
 - c. What quality measures are used and when is quality determined? _____
 - d. How are prices determined? _____
 - For formula pricing, what is the base and timing of the base? _____
 - What types of premiums or discounts are applied? _____
 - e. How far in advance of delivery are the arrangements made? _____
 - f. What are the delivery arrangements (who arranges, who pays)? _____
 - g. What termination options are available? _____
 - h. How are disputes settled? _____
 - i. Other key characteristics? _____
2. What are the primary reasons your company uses this method to procure livestock?

 - If this method affects **costs**, what would you guess is the percentage change in costs compared to using the spot market? _____
 - If this method affects **quality**, what would you guess is the percentage change in value compared to using the spot market? _____
3. How do buyer requirements influence methods of livestock procurement?

4. What procurement methods would your company like to use that it is not currently using? Why aren't these methods being used currently?

5. How do you expect your company's use of procurement methods to change in the next 5 years? Are these changes due to customer preferences?

Part 4. Types of Sales Methods Used

1. What types of methods does your company use to sell or transfer meat?

2. How would you classify these sales methods?

- ☐ Spot market/open market
- ☐ Direct trade
- ☐ Dealer/broker
- ☐ Electronic auctions
- ☐ Forward contract
- ☐ Marketing agreement
- ☐ Internal company transfer

3. What types of alliances do you participate in on the sales side?

4. Who are the participants in the alliance?

- ☐ Genetics/seed stock supplier
- ☐ Feed company
- ☐ Livestock producer
- ☐ Finisher/feedlot
- ☐ Processor
- ☐ Food service
- ☐ Retailer
- ☐ Exporter
- ☐ Another segment (specify: _____)

■

Part 5. Characteristics of Sales Methods Used

1. What are the characteristics of your most frequently used sales method for meat?
 - a. Is it oral or written? _____
 - b. Are there specific quantity or quality requirements? _____
 - c. What quality measures are used and when is quality determined? _____
 - d. How are prices determined? _____
 - For formula pricing, what is the base and timing of the base? _____
 - What types of premiums or discounts are applied? _____
 - e. How far in advance of delivery are the arrangements made? _____
 - f. What are the delivery arrangements (who arranges, who pays)? _____
 - g. What termination options are available? _____
 - h. How are disputes settled? _____
 - i. Other key characteristics? _____
2. What are the primary reasons your company uses this method to sell meat?

 - If this method affects **costs**, what would you guess is the percentage change in costs compared to using the spot market? _____
 - If this method affects **quality**, what would you guess is the percentage change in value compared to using the spot market? _____
3. How do buyer requirements influence methods of meat sales?

4. What sales methods would your company like to use that it is not currently using? Why aren't these methods being used currently?

5. How do you expect your company's use of sales methods to change in the next 5 years? Are these changes due to customer preferences?

Part 6. Effect of Restrictions on Packer Ownership of Livestock

If relevant, please describe the effects that restrictions on packer ownership would have on your company.

1. **Short-Run Effects**—What kind of immediate adjustments would your company have to make if packer ownership of livestock was restricted?

2. **Long-Run Effects**—What effect would restrictions on packer ownership of livestock have on how your company operates in the long run?

Contact Information:

If you have questions about this discussion or the study, please contact Laurel Clayton at 919-541-1242 or lclayton@rti.org.

**Discussion Guide—Wholesalers, Retailers, Food Service Operators, and Exporters
GIPSA Livestock and Meat Marketing Study**

In the questions below, marketing arrangements refer to methods of selling or transferring livestock and meat through the supply chain, such as traditional spot markets, marketing contracts, internal transfers, and others. We are interested in obtaining a company-wide perspective, but please explain any significant regional differences. Please note that all information from this discussion will be summarized with other responses in our report to GIPSA.

Part 1. Company and Plant Characteristics

1. Which types of meat products does your company handle?

2. What types of establishments does your company operate?

3. Which regions of the country does your company operate in?

4. From what types of companies do you buy meat products?

5. To what types of companies do you sell meat products?

6. What is the total employment for your company?

7. Is your company publicly owned, privately owned, a cooperative, or other (please specify)?

Part 2. Types of Procurement Methods Used

1. What types of methods does your company use to purchase or receive meat?

2. How would you classify these purchasing methods?

- ☐ Spot market/open market
- ☐ Direct trade
- ☐ Dealer/broker
- ☐ Electronic auction
- ☐ Forward contract
- ☐ Marketing agreement
- ☐ Internal company transfer

3. What types of alliances do you participate in on the buying side?

4. Who are the participants in the alliance?

- ☐ Livestock producer
- ☐ Packer/processor
- ☐ Food service
- ☐ Retailer
- ☐ Exporter
- ☐ Another segment (specify: _____)

Part 3. Characteristics of Procurement Methods Used

1. What are the characteristics of your most frequently used procurement method?

- a. Is it oral or written? _____
- b. Are there specific quantity or quality requirements? _____
- c. What quality measures are used and when is quality determined? _____
- d. How are prices determined? _____
 - For formula pricing, what is the base and timing of the base? _____
 - What types of premiums or discounts are applied? _____
- e. How far in advance of delivery are the arrangements made? _____
- f. What are the delivery arrangements (who arranges, who pays)? _____
- g. What termination options are available? _____
- h. How are disputes settled? _____

- i. Other key characteristics? _____
2. What are the primary reasons your company uses this method to procure livestock?
- _____
- _____
- If this method affects **costs**, what would you guess is the percentage change in costs compared to using the spot market? _____
 - If this method affects **quality**, what would you guess is the percentage change in value compared to using the spot market? _____
3. What types of requirements do you place on meat suppliers?
- _____
- _____
4. What procurement methods would your company like to use that it is not currently using? Why aren't these methods being used currently?
- _____
- _____
5. How do you expect your company's use of procurement methods to change in the next 5 years? Are these changes due to customer preferences?
- _____
- _____

Part 4. Types of Sales Methods Used

1. What types of methods does your company use to sell or transfer meat?
- _____
- _____
2. How would you classify these sales methods?
- ☐ Spot market/open market
 - ☐ Direct trade
 - ☐ Dealer/broker
 - ☐ Electronic auctions
 - ☐ Forward contract
 - ☐ Marketing agreement
 - ☐ Internal company transfer
3. What types of alliances do you participate in on the sales side?
- _____
- _____

4. Who are the participants in the alliance?

- ☐ Livestock producer
- ☐ Packer/Processor
- ☐ Food service
- ☐ Retailer
- ☐ Exporter
- ☐ Another segment (specify: _____)

Part 5. Characteristics of Sales Methods Used

1. What are the characteristics of your most frequently used sales method for meat?

- a. Is it oral or written? _____
- b. Are there specific quantity or quality requirements? _____
- c. What quality measures are used and when is quality determined? _____
- d. How are prices determined? _____
 - For formula pricing, what is the base and timing of the base? _____
 - What types of premiums or discounts are applied? _____
- e. How far in advance of delivery are the arrangements made? _____
- f. What are the delivery arrangements (who arranges, who pays)? _____
- g. What termination options are available? _____
- h. How are disputes settled? _____
- i. Other key characteristics? _____

2. What are the primary reasons your company uses this method to sell meat?

- If this method affects **costs**, what would you guess is the percentage change in costs compared to using the spot market? _____
- If this method affects **quality**, what would you guess is the percentage change in value compared to using the spot market? _____

3. How do buyer requirements influence methods of meat sales?

4. What sales methods would your company like to use that it is not currently using? Why aren't these methods being used currently?

5. How do you expect your company's use of sales methods to change in the next 5 years? Are these changes due to customer preferences?

Contact Information:

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